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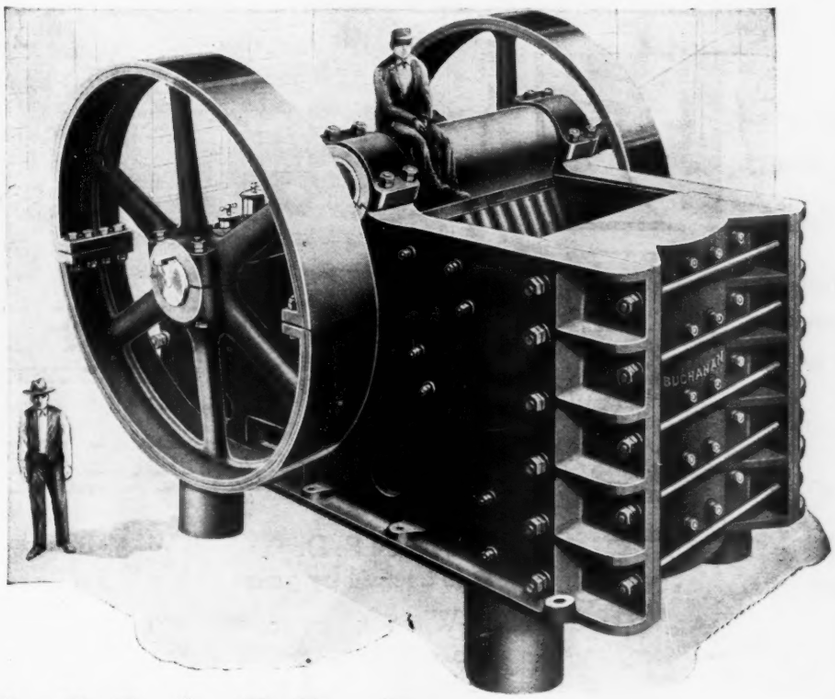

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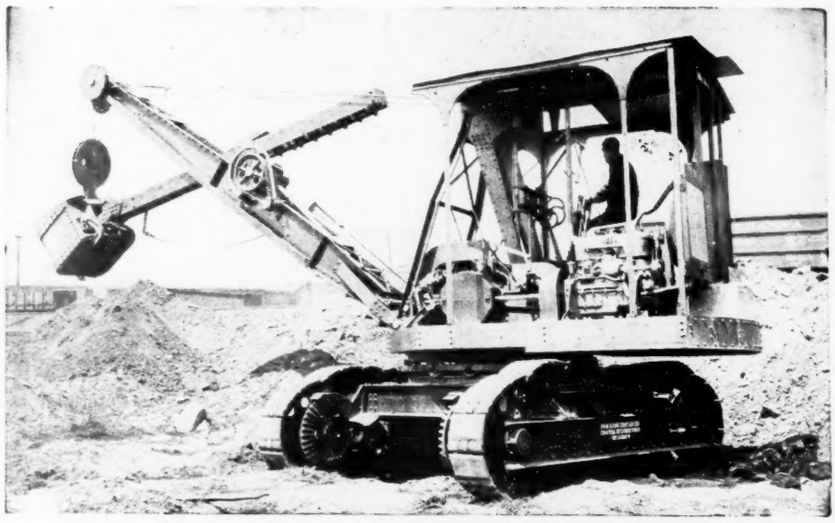

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Rock Products

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Quarrying "Bessemer" Limestone in Colorado

High Grade Limestone Sought in the High Mountians—Contented Labor in Isolated Locations

By J. H. Freeman
Salida, Colo.

IN the early days of Leadville the dozen or more smelters there consumed an immense quantity of limestone. This was procured from ledges immediately along the railroad track near Florence, less than 150 miles distant, where the cost of dropping it into the cars from the overhanging cliffs was insignificant. These quarries, although practically inexhaustible, have since been abandoned for those of a better quality of stone but more expensive to reach. Thus it will be seen that quality plus low cost rules the business.

Ten years ago well equipped quarries in Colorado put limestone on the cars for less than 50 cents per ton. During the war the smelters paid as high as $1.25 per ton and smelting charges soared. At present the price paidis less than 90 cents per ton f.o.b., producing plant.

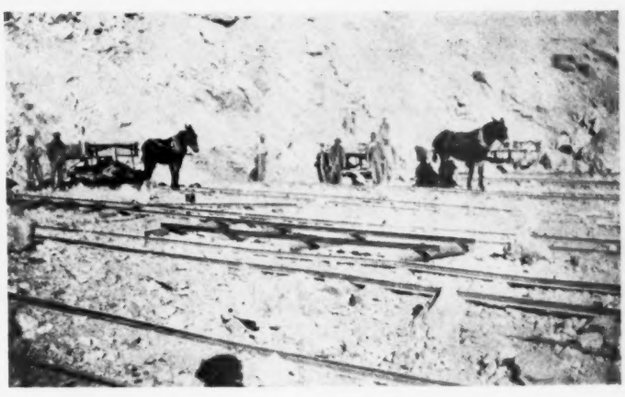
The market now requires a limestone which is almost pure. Anything which tests under 98% is refused unless it is practically applicable to some specific use; 2% of insoluble matter — only 40 lb. per ton — disqualifies it. Even a smaller amount of such substances as phosphorus or sulphur unfits it for many uses. Recently a shipment of three cars was refused by a sugar factory because the analysis showed it to contain a fraction of a per cent more insoluble matter than the contract called for—2%—and the shipper had a freight bill of over $1300 to pay besides losing the three cars of stone. A single chunk of flint or granite of a size which a man could toss into the wagon would cause that ton of rock to be refused.

Along the Rocky mountains the better grades of limestone seem to be those of the Carboniferous period and these are to be found only in the high altitudes. In these steep rough regions it has been something of a problem to get the material to the railroads. That this problem has been solved is evident from the fact that a large amount of the supply is now being quarried at elevations up to 8000 ft. above sea level and transported right past the old abandoned quarries to the markets beyond.

One of the most important sources of supply is near Salida, Colo., in the Arkansas river valley. Of

Looking up the canyon from Calcite, the quarry town of the Colorado Fuel and Iron Co.

Hand quarrying methods—no crushing plant at the quarry



Cars hauled by mules from tipple to quarry face return loaded by gravity

the several quarries in this vicinity those owned and operated by the Colorado Fuel and Iron Co. at Calcite are the most extensive. This company is also one of the largest consumers of limestone. They operate extensive steel works at Pueblo and the entire product of their quarries at Calcite is used in their own furnaces.

Some 20 years ago this company sent experts into the district who spent about a year testing the material by boring deep holes, with a diamond drill, in all parts of the ledges. The cores from these drill holes told the story of what was beyond the reach of the eye, where the rock was bad, and where it was good, and how good it was. The rock proved to be a very good Bessemer rock because of its very small phosphorus content. Being almost entirely free of phosphorus and sulphur it is well adapted to the manufacture of Bessemer steel.

The lime ledges which furnish the supply stand up almost perpendicularly, more than 1000 ft. in height, like the leaves of a book standing on end. They run across both branches of the canyon, a few hundred feet above the forks, thus making ideal locations for the four quarries situated at their base. The lime stratum is a half mile thick and the supply is practically inexhaustible as it extends for miles back in both directions. There is very little overburden.

The capacious loading bins are at the junction of the two branches of the canyon and the tram tracks from all four of the quarries have a down grade drift to the top of the chutes. The tram cars are hauled to the floor of the quarry by mules, the rock is loaded in by hand, and thereafter it finds its way to the tipple and into the railroad car automatically.

This company has quarried and shipped 3,500,000 tons of limestone from these quarries, besides disposing of approximately 1,000,000 cu. yd. of waste material. The daily tonnage is limited by the demands of their plant at Pueblo. They have shipped 1200 tons daily when needed. At present the daily output is about 550 tons and 60 men are required to produce it.

Ideal Village

The workmen and their families form a community of about 200 persons. They are housed in company buildings along both sides of the one street which runs up the narrow canyon. The houses are large and comfortable, mostly two-family, though in the upper part of the town they are of two stories and will accommodate four families. The whole town of Calcite belongs to the company, and is a model of beauty, comfort, and utility. It is provided with electric lights from their own power house, water-works from the cold mountain stream which flows from the snow-clad mountains above, down through the whole length of the town, and with telephone connection with the Mountain States Telephone Co. which reaches out to most of the cities of the state.

The company has erected a beautiful school house and club house and supplied many forms of amusements for the children, and grown-ups as well. Several iron framed swings have been erected. School is maintained during the school year at the company's expense. Liquor is prohibited and sanitary measures enforced. A company physician is part of the force.

R. B. Jerrard, who has been resident superintendent from the start, has left no stone unturned in his efforts to add to the natural beauty of the place and make it a desirable place in which to live.

The freedom from strikes, wage controversies, and other troubles generally incident to such enterprises, and the efficiency attained, reflects the contentment of the workers, and proves the good judgment employed.

Company houses for employes. Part of school house at right; garage at left; water tank on side hill in center

Face and floor of south quarry. Man drilling at top. Looking down on tram tracks

Upper camp—upper quarry. Notice limestone strata on end at peak outcrops

General view of the W. T. Hardison plant, Nashville, Tenn.

Installs Efficient Storage and Handling System for Sand and Gravel

New Plant of the W. T. Hardison Co., of Nashville, Tennessee

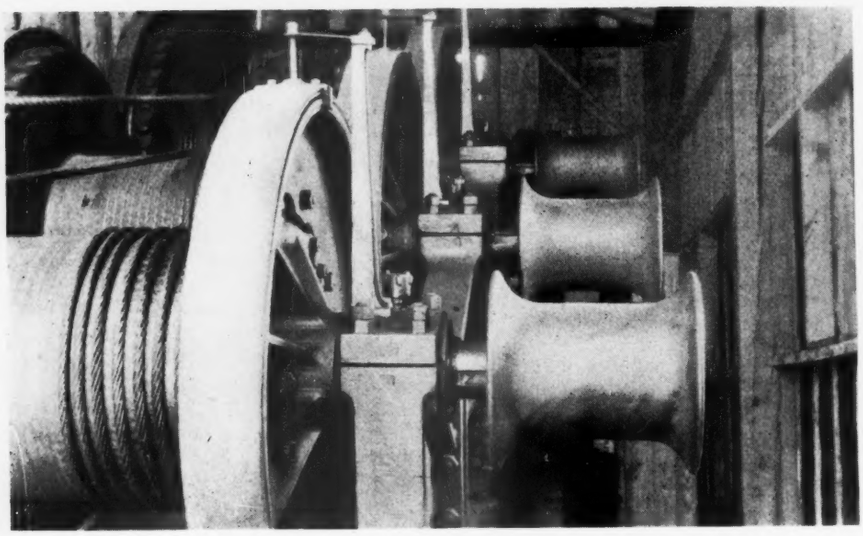
THE name "Hardison" is familiar to everyone in middle Tennessee who is interested in building materials. A big area at the end of the Sparkman street bridge in Nashville contains not only the offices and warehouses of the company but brick yards and great piles of tiling and other clay products, and a sand and gravel storage and rescreening plant that will be one of the best designed and best built in the South when it is completed. To compare it with the old plant which is still in operation is to understand how a business of this kind may grow and prosper under a steady policy of keeping up with the demand of the market plus good management.

The sand and gravel is dredged from bars in the Cumberland river about 12 miles above Nashville. The bars are compacted and the gravel is not deep, conditions which have been met by the use of a "bucket line" or ladder dredge. Centrifugal pumps have been much employed on this river, but not with signal success. A neighboring pro-

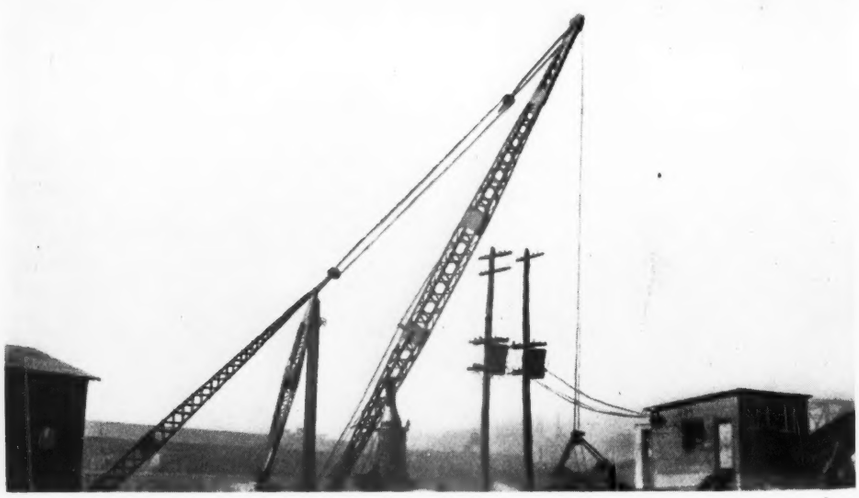
New warehouse and office

Bucket line dredge taken from across the river

Part of bucket line on dredge. The buckets hold only 2 cu. ft.



Hoist for stiff-leg derrick



Boom of stiff-leg derrick 90 ft. long

ducer to the Hardison Co. employs a dipper dredge with considerable success, but aside from this the bucket line dredge is employed altogether.

The buckets are smaller than those used on the Potomac and other Eastern rivers. On the Hardison dredge, the "Francis," the buckets are of only 2 cu. ft. capacity. But in the new dredge which the company is planning to build they will be larger.

Sand-Gravel Separation on Dredge

A screen on the dredge separates all the material dug into gravel and sand which are loaded into two barges, on either side of the dredge. These barges are then towed to the shore plant at Nashville where the sand is sent at once to storage and the gravel is rescreened into two sizes and an oversize which is crushed and added to the screen product.

At present the handling into storage and out of storage to the bins from which it is loaded to trucks or to railway cars is done by two locomotive cranes with 1½ yd. buckets. One of these is an Orton & Steinbrenner, the other a Brownhoist. Naturally these cranes will still be employed when the new system is operating, but their work will be principally loading out of storage.

The barges in which the sand and gravel are brought from the dredge are 100x26 ft. and hold nearly 300 tons in the 30-in-deep hopper. They are of the flush deck type and are built by the company, as are all the boats and barges of the company. One of the pictures with this article shows the hull of a new tow-boat on which the carpenters are working.

The barges are unloaded by a new stiff-leg derrick with a 90-ft. boom, built by the American Hoist & Derrick Co. of Minneapolis. It is handled by a 3-drum hoist of the same make powered with a 125-hp. motor.

The derrick has a 2-yd. bucket which empties into a concrete hopper holding 75 tons from which the material will be fed to one or all of these belt conveyors.

Novel Conveyor Installation

The installation of these conveyors is novel. They are supported on a steel frame 13 ft. wide inside and are parallel. One of them is arranged with a tripper to discharge to storage on the water side of the loading bin, one carries the material to the bin, or puts it through a rescreening plant with "Hum-mer" screens, which is to be placed on top of the bin, and the third takes it to a storage pile which will extend for 228 ft. on the land side of the bin. All this conveyor plant material except the frame and structure is "salvage" from government work built near Nashville and is practically as good as new.

The ability to utilize salvaged material has further resulted in the construction of a most unusual loading bin. This bin is supported on concrete bearing walls so as

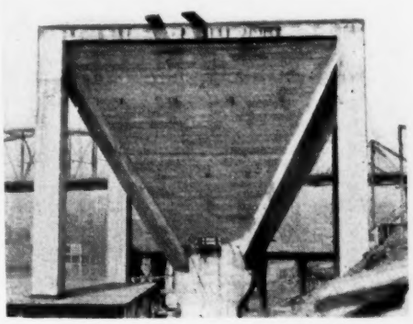
to give a 15-ft. clearance to the trucks that drive under it. The modern truck with its high cab requires about as much clearance as a railway car. The bottom of the bin proper is a very heavy slab of concrete reinforced in the usual way and also with steel I-beams, 24 and 30 in. deep. The gates to the bins are between these deep beams and the concrete is sloped down to the gates to provide a hopper. The gates themselves are of a rack-and-pinion design, locally made, and operate by a chain which runs over a pulley at the end of the pinion shaft.

The partitions of the bin are 8x8-in. timbers cribbed and held in position by heavy rodding. The outside walls are of heavy planking with the usual posts and walers.

Exceptionally Solid Construction

Such massive and heavy construction would hardly be justified if one were to build new bins, but the cost was low, as the material was "salvage." And it has the advantage of providing a very solid foundation for machinery and all the motors for the belt conveyors as well as the rescreening plant will be placed on top of this bin.

The bin holds 800 tons and has three compartments, two for gravel and one for sand. The oversize from the rescreening is to be crushed, but the disposal of the crushed material may vary with the market conditions.



Concrete hopper which holds 90 tons.

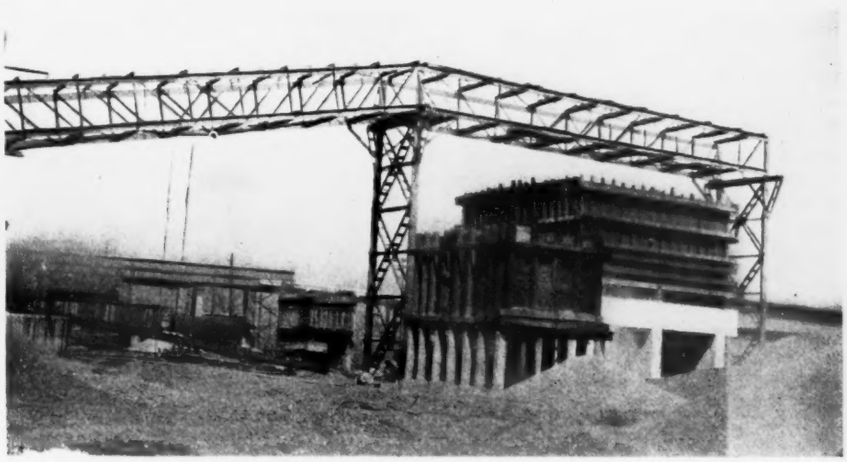
It is expected that the new dredge will not only separate the material it digs into gravel and sand but also separate the gravel into the two standard sizes used here. That is why all the material unloaded will not pass through the rescreening plant.

The present screening plant has rotary screens with 5/8-in. and 1 7/8-in. round holes. The undersize of the smaller screen is sand and the oversize of the larger screen is crushed and added to the gravel.

One who visits the plant in its present unfinished condition is struck by the substantial construction used everywhere. The stiff-leg derrick, for example, is set on massive concrete piers which are placed above creosoted piling, 36 piles having been driven to support the center pier and mast alone. This pier and those supporting the stiff-legs are so tied together that there is no chance of the mast getting out of line. "It either has to stand up straight or fall into the river as one piece," as Mr. Hardison expressed it.

W. T. Hardison, who is the company, practically, may be said to have been born into the sand business, as his father engaged in it just after the Civil War and continued in it for many years. The son added various other lines until he built up the great business he owns.

Base of stiff-leg derrick. The old wooden unloading hopper is just beyond



Loading bin and trestle which will be carried on 228 ft. beyond the bin

Old screening plant which is to go out of commission shortly

Road and Pavement Aggregates*

Recommendations as to Size and Other Properties of Crushed Stone and Sand and Gravel Used in Highway Construction

By John H. Bateman

Director, State Highway Laboratory, and Assistant Professor of Highway Engineering, University of Michigan

IN any large program of road construction gravel and broken stone aggregates comprise the bulk of materials used. The engineer or public official is mainly concerned with obtaining the proper sizes and grading of these aggregates which will insure certain wearing qualities and strength or stability in the structures with whose design and construction he is entrusted. Producers of these aggregates are concerned mainly with the economic side of production. It is perfectly obvious that in many cases these two viewpoints will conflict.

Present-day types of roads and pavements involving the use of gravel and stone aggregates comprise gravel roads, concrete pavements, macadam roads, and bituminous concrete pavements. To this list we may add the binder course of sheet asphalt pavements, which is in itself a bituminous concrete. From the viewpoint of Michigan conditions and quantities of materials used, the types which are of greatest concern are gravel roads, concrete pavements and macadam roads.

It is the purpose of this paper to discuss some of the more important considerations affecting the sizes of stone and gravel for these three types of roads and pavements and their relationship with the general problem of production and with other purposes for which these aggregates are used.

Gravel Roads

Large quantities of gravel for gravel roads will continue to be used for many years in those locations where gravel is economically available and where such material will satisfactorily meet traffic requirements. It is probably unnecessary to spend much time in consideration of road gravel, inasmuch as the principal features of this material are now so well standardized in this state. The value of using gravel up to ¾ in. to 1 in. in size for the surface course is quite thoroughly recognized, as well as the desirability of using gravel up to 2½ in. in the base course.

Concrete Pavements

On account of the widespread deposits of gravel in Michigan the use of this material for concrete pavements is more general than the use of crushed stone.

The proper maximum size for gravel coarse aggregates in concrete pavement is not open to much discussion or argument. Two and one-half to three inches is quite generally regarded as the largest desirable size. Smaller aggregates can be used, depending upon the maximum size of the gravel from available deposits.

The size of crushed stone for concrete pavement construction may be governed to some extent by the available uses of stone for other purposes. Reference will later be made to this phase of the subject in connection with the production of crushed stone for macadam purposes.

Macadam Roads

Two types of macadam roads are now in general use, waterbound macadam and bituminous macadam constructed by the penetration method. On account of its non-adaptability to motor vehicle traffic, plain water-bound macadam road, without a subsequent treatment with some bituminous material, is now seldom constructed. In this discussion, therefore, reference to water-bound macadam roads infers surface treatment with bituminous material relatively soon after construction.

The size of stone for macadam roads is of great importance and will depend upon a number of factors. These may be listed as follows:

1. Quality of the stone.
2. The type of fracture of the stone.
3. Uniformity of the stone.
4. The character and amount of traffic.
5. The method used in constructing the road.
6. Economy of production.

Quality of the Stone. The quality of the stone exerts an important influence on the selection of the proper size. A soft stone will break more easily under a roller than a hard stone, and for that reason it is desirable to crush soft stone to a larger size than would be the case with hard stone.

Type of Fracture. Different deposits of stone, even of the same general type, sometimes show marked differences in the character of the fractured pieces. These differences in fracture are due principally to the quality or properties peculiar to certain rocks and to the thickness of the various strata in the quarry. The extremes in type of fracture were noticed recently in an examination of two limestone quarries located within a comparatively short distance of each other. In one quarry the layers or strata were comparatively thin. The crushed stone in this quarry above 1 in. in size broke into flat pieces, comparatively thin, while the crushed product below 1 in. in size was cubical in shape. In the other quarry all products above 1 in. had a cubcial or pyramidal fracture with a large percentage of flat pieces in the product under 1 in. in size. The latter quarry produced a very good grade of stone for macadam purposes, whereas the product of the former quarry would be unsatisfactory. On the other hand, the product of the first quarry would be entirely suitable for bituminous concrete, whereas that from the second quarry would not be so satisfactory.

Uniformity of Product. In some rock quarries we find a wide variation in the quality of the rock. This non-uniformity, if particularly pronounced in a vertical direction in the quarry, works to a disadvantage with large sizes of rock in the surface course of macadam roads. Wear is uneven and the surface becomes rough. Crushing to a smaller size decreases the tendency toward an uneven surface.

Character and Amount of Traffic. The character and amount of traffic which a macadam road will sustain, in view of the generally large proportion of passenger automobiles, is of importance mainly when it is desired to maintain the road as a plain water-bound macadam. In such cases, which are now comparatively rare, the presence of large stone in the surface course tends to produce unevenness.

Method of Construction. Under the present method of compacting macadam roads with heavy rollers, the use of large fragments of stone in the surface is practicable. The large pieces of stone resist crushing under traffic better than small fragments and are dislodged with much more difficulty, thus preventing raveling much better. Water-bound macadam is usually treated with a surface application of bituminous material, and here the presence of large fragments possesses distinct advantages over small pieces of stone. When large fragments of stone are used the surface of the road may be more easily cleaned and prepared for surface treatment and the ability of the

*Abstracted from Proceedings of Ninth Annual Conference of Highway Engineering, held at the University of Michigan.

bitumen to adhere to the fragments is increased.

The use of large fragments of stone in both courses of a macadam road is advantageous if the size of stone in each course is the same. This fact is quite apparent to macadam road contractors, most of whom would prefer to use the same stone in each case. Greater convenience in ordering material would result and in some instances, at least, delays would be avoided. Inspection of the material would also be facilitated.

Economy. The foregoing discussion of macadam stone has been concerned with the viewpoint of the road builder alone. The road builder and stone producer are both concerned with the economic side of stone production. The producer is anxious to produce stone at a low price and to be able to dispose of his entire product, or as much of it as possible. The markets of various producers vary and one producer is often confronted with conditions which do not confront another and which have a material affect upon the cost of producing stone. It is certain that no common set of conditions may be outlined which will be generally applicable to all producers.

In order to utilize the entire product of a stone crushing and screening plant, specifications have usually provided that crushed stone for the base course of macadam roads shall range in size approximately from 3½ to 2 in. and for the top course approximately 2 in. to 1 in. Exact limits have varied, but these sizes are quite general. The use of a larger size stone for the top course is being advocated by many engineers and road officials, particularly when relatively soft stone, such as limestone and dolomite, is to be used. The same size has, therefore, been suggested for both courses, ranging from 4 to 3½ in. down to 2½ or 2 in. Such practice will eliminate from macadam construction stone ranging from 2½ to 2 in. to 1¼ or 1 in. in size, and unless the stone producer has a market for such material a waste product will result. Some producers have such marketing possibilities, especially for such uses as railroad ballast, concrete, and other purposes. It may frequently happen that the use of the same product for top and bottom courses will not be of serious concern to some producers. The speaker knows of several producers whose markets are such that this is the case.

The question in many cases becomes a purely economic question. We may be thoroughly convinced that the use of a single product is highly desirable. Our best judgment should tell us whether we should be willing to pay for the increased price when an increase in cost of production is unavoidable.

Specifications for Aggregates

It may not be out of place in our discussion of sizes of aggregates to give some consideration to proper methods to use in specifying sizes and grading. Some specifications state specific details to be observed in the production of aggregates. Better practice specifies the properties required in the finished products and leaves the matter of production to meet these requirements entirely in the hands of the producer.

The former method is uncertain because of the many details which must be covered. The efficiency of screening operations depends upon several factors:

1. The kind and quality of the aggregate.
2. The size and shape of the screen opening.
3. The pitch of the screen.
4. The diameter of the screen.
5. The length of the screen.
6. The speed of the screen.
7. The rate at which the screen is fed.
8. The velocity with which the aggregate enters the screen.
9. The volume of water used in washing.

Some of these factors are naturally of greater importance than others. The pitch of a screen, for instance, is quite definitely fixed, as is the speed of operation. Quite frequently the effect of size and shape of screen opening and the length of the screen is not fully appreciated. The size of the opening should not necessarily be that stated in a specification for size. A moving stone or pebble, unless it travels an impracticably long distance, will not pass through an opening of the same size or but very little larger than its own diameter. This is particularly true in the case of screens having circular openings. The following case will serve to illustrate this point: A stone crushing and screening plant was attempting to produce crushed stone for macadam roads according to the present specifications of the Michigan State Highway Department, which provided for a base course stone ranging in size from 3½ to 2 in. and a top course stone ranging in size from 2 in. to 1 in. The stone was passed through a rotary screen having 3¾-in. holes and over a rotary screen having 2-in. holes. The material passing through the 2-in. rotary screen was passed over a 1¼-in. rotary screen. An analysis of the two products from these screens showed that the larger product contained no stone over 3½ in., but contained 25 per cent of material below 2 in. The smaller product showed 9 per cent below 1 in. in size and only 41 per cent above 1½ in. The 3¾-in. and 1¼-in. screens were efficient in meeting the largest and smallest requirement, but the 2-in. screen produced an excess of small particles in the large product and caused a deficiency in the upper sizes in the smaller or top course product. I believe that if this plant had used a 2½-in. rotary screen in place of the 2-in. screen the proper separation of sizes would be obtained, providing, of course, that all other conditions were maintained.

In a similar case it was discovered that a gravel plant was attempting to produce a gravel coarse aggregate having a minimum size of ¼ in. with a screen having 3/16-in. openings.

The following specifications for size and grading of aggregates are drawn to serve as suggestions for specifications which fulfill the foregoing requirements.

Concrete Pavements.—The following grading is suggested for gravel or crushed stone coarse aggregate for concrete pavements:

Passing 2-in. screen, not less than 95 per cent.

Passing 1-in. screen, 25 to 75 per cent.

Passing ¼-in. screen, not more than 15 per cent.

Passing 8-mesh sieve, not more than 5 per cent.

Water-bound Macadam. When limestone is used for water-bound macadam, using the same size for both courses, the following grading is suggested.

Base and Top Course

Passing 3½-in. screen, 95 to 100 per cent.

Retained on 3-in. screen, not less than 20 per cent.

Passing 2-in. screen, not more than 15 per cent.

Chips

Passing 1¼-in. screen, 100 per cent.

Retained on ¾-in. screen, not less than 15 per cent.

Passing ¼-in. screen, 15 to 40 per cent.

Passing 8-mesh sieve, not more than 10 per cent.

Bituminous Macadam.—The following grading is suggested for bituminous macadam constructed by the penetration method, using hard grades of stone, such as granite, trap rock and quartzite:

Base Course

Passing 3½-in. screen, 95 to 100 per cent.

Passing 2½-in. screen, not more than 15 per cent.

Top Course

Passing 2½-in. screen, 100 per cent.

Passing 1¾-in. screen, 40 to 75 per cent.

Passing 1¼-in. screen, not more than 15 per cent.

Coarse Chips

Passing 1¼-in. screen, 100 per cent.

Retained on ¾-in. screen, not less than 90 per cent.

Retained on 8-mesh sieve, not less than 97 per cent.

Fine Chips

Passing ¾-in. screen, 100 per cent.

Passing ¼-in. screen, not more than 15 per cent.

Passing 8-mesh sieve, not more than 5 per cent.

Asphaltic Concrete. The following sizes for asphaltic concrete could be readily obtained in a plant equipped to produce crushed stone in accordance with the specifications for the other purposes just previously described:

Coarse Graded Type, Binder Course

Passing 1¼-in. screen, 100 per cent.

Pasing ¾-in. screen, 25 to 75 per cent.

Passing ¼-in. screen, 3 to 10 per cent.

Mighty Promising Signs of the Season's Activity in Dixieland

Big Investments Being Made in Sand and Gravel Industry at Memphis and Nashville

By Edmund Shaw
Editor, Rock Products

WHEN one who is interested in such matters leaves Chicago for the South, as the writer did a week ago, he notices a considerable difference in the most widespread of rock products industries, which is the production of concrete aggregate. All the country around the Great Lakes is well supplied. Limestone is quarried and crushed almost in the heart of Chicago, and throughout the states of Illinois, Indiana, Wisconsin, Michigan, and Ohio there is hardly a city but has ample resources from which to draw crushed rock or gravel. Gravel indeed is something more than abundant, for the glaciers of the ice age obligingly dumped uncounted millions of tons of it right where it would be handy for the cities of the future.

The Aggregate Situation at Memphis

But the case is different in Memphis, which was the first stop on the way South. Not that this enterprising and busy city has had to lay off on its building plans for want of aggregate, but it has had to go a long way for its supplies. The Memphis Stone and Gravel Co., for example, has its plants at Iuka, Miss., at Camden, Tenn., and near Paducah, Ky., at distances ranging from 125 to 150 miles. The Fischer Lime and Cement Co., the largest firm dealing in building materials, runs a big quarry at Williford, Ark., 146 miles away. Stone and gravel are shipped into the city from points even as far as 300 miles distant.

There is plenty of good limestone near Memphis—very near, only 500 ft. away in fact. But alas! the direction of the deposit is straight down and not sideways. Memphis people know all about it, for their excellent drinking water comes from

End view of new 125-car concrete bins of the Fischer Lime and Cement Co.

a gravel stratum on the under side of this Mississippi limestone, the city being the largest that draws its entire water supply from artesian wells. But to get any of the stone for building purposes they must go east toward middle Tennessee, or west into Arkansas, where the limestone is of a less retiring disposition.

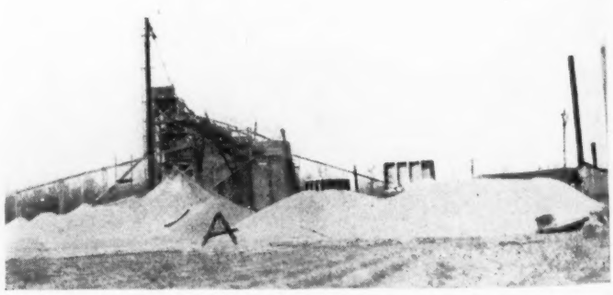
Gravel, however, is another—and a very interesting story. There is an abundance of it in the Mississippi river, right at the door of the city. Unfortunately it contains so much lignite that in its natural state it is fit for nothing but railroad ballast. However, the Fischer Lime and Cement Co. refused to let a little thing like a small percentage of lignite keep them from making the gravel into a marketable product. They went at it in two ways. First they hunted the river until they found a stretch that had rather less lignite than anywhere below, some 50 miles above the city, and second they hunted for a method that would take out the lignite altogether. They found it in jigging, the same process that is used for washing coal. In fact, the lignite removal method might be described as coal washing with a "reverse English."

Just about the time they had the problem solved another of the strokes of fate that seem to hit every pioneer or investigator fell upon them. And this was "some stroke"—nothing less than the fall of the entire plant into the Mississippi, as readers of Rock Products will remember. It was as if the old river had roused in its wrath and given the plant a "side swipe" as a deterrent to further operations.

Rebuilding a Plant That Slipped Into the River

The almost total loss of a $150,000 plant

Plant of the Crow Creek Gravel Co., Madison, Ark., showing movable hopper



View of plant and stock piles of the Wolf River Sand Co.

would have been enough to discourage many companies, but the Fischer company had the nerve to go ahead and plan the building of one of the most elaborately constructed sand and gravel plants in the country. The great concrete bins and the structure for the 400-ft. centers belt conveyor and the unloading dock are about completed as this is written, and they are enough to show that the company expects to build a solid and enduring business as well as the best plant that it knows how to build.

The whole thing is a splendid example of the combination of engineering and business talent that is doing so much for modern industry. First comes the research work for the method, then the small scale tests, then the commercial scale test, and finally the calm decision to invest a huge sum in a plant, confident that the problem has been solved and that the venture will be a financial as well as an engineering success.

But this is not the only company that is doing new and interesting work in sand and gravel operation in and around Memphis. The Wolf River Sand Co. took an interest in a plant near Madison, Ark., where a creek bed was being worked with a cableway dragline for gravel. This was originally one of Scott Bond's enterprises. As the deposit was not deep it was seen that it would be necessary to change the position of the mast pretty often in order to get much of a production. Shifting a 125-ft. steel mast is no small job. To avoid this work Mr. Cordes, the president of the Wolf River Co., worked out a scheme for a movable hopper over a belt conveyor that can be readily changed so that the dragline bucket may dig through a wide angle without the mast being changed.

One might wonder at the choice of a cableway dragline to work such a shallow deposit, but the reason is that the deposit is one of those desirable ones that renews itself after the heavy rains each year.

The gravel for this plant comes from the lower end of Crawley's Ridge, which Professor Dake described in his paper read at the St. Louis convention of the National Sand and Gravel Association. It is possibly the farthest south of the glacial outwash deposits. The pebbles are very hard, flint, quartzite and like rocks predominating, and of course the gravel is of excellent quality.

Lots of Sand Around Memphis

If Nature has been miserly with coarse aggregate in the vicinity of Memphis she has been prodigal with sand. There is an abundance of it on Wolf river, in the city limits and the Missouri Portland Cement Co. has a plant there which is the heaviest producer near the city. And it is a considerable producer of gravel, which is found with the sand. The plant is interesting because it uses stationary screens altogether, the same as the plant which the company operates on the Meremac river near St. Louis. The Wolf River Sand Co. has a plant nearby and does a big business by truck as well as by rail.

The sand from Wolf river is highly silicious, appearing much like the silica sand from the deposits in southern New Jersey. It has been tested for use as furnace bottoms and for steel molding sand and found to be adapted to these purposes, but there is no present market for it near at hand. When Memphis does more heavy manufacturing as she is bound to in the not distant future, this sand will have an increased value.

The Wolf River Sand Co. has recently installed a small concrete brick plant "for educational purposes," meaning that the company is more interested in familiarizing architects and the general public in the advantages of concrete brick than it is in making a profit from the operation.

Cement Plant at Nashville Operating

At Nashville the most important piece of news in the rock products field is that the new plant of the Hermitage Portland Cement Co. is now producing with one kiln and in its first week has already passed its calculated 24-hour output for one kiln. This is a rather remarkable record for a new plant, as "teething troubles" are apt to delay full production for a considerably longer period. It reflects considerable credit on both the designer and manager.

As to the aggregate situation in Nashville it is unique. If Memphis suffers from a deficiency of resources from which to draw her supplies, Nashville may be said to have too many resources for the good of the industry as a whole. The city is situated on the edge of the great area or Ordovician limestone that occupies the center of the state and there are limestone bluffs along the Cumberland and exposed at various points so that finding a quarry site of some sort is an easy matter. And quarries, such as they are, are abundant. The county operates several small ones, the city of Nashville, having scrapped her little crusher plants, has put up a fairly good sized plant, and the state highway department and even the street railway company have opened their own quarries.

Hardison sand and gravel plant from Sparkman street bridge, Nashville, Tenn.

Public-Owned Crushing Plants at Nashville

These supply the bulk of the paving material for streets and highways. Of commercial stone producers the writer could learn of only two who were selling in the Nashville market, the Ezell Mill and Stone Co., which has a quarry at Newsom Station about 50 miles east of the city, and the Franklin Limestone Co. with a quarry at Antioch, 18 miles south. The latter is an especially heavy producer of railroad ballast which the L. & N. R. R. uses. This plant is being replaced by a new

and larger one. The same company also operates a plant at Lewisberg. The two companies mentioned supply about 50% of the stone used in Nashville.

But while such enterprising producers as these can continue to do business, the effect of these city, county, and semi-public quarry operations is bad for the industry. Some business men with whom the writer talked were quite outspoken in their criticism. They said that there was a lack of responsibility about the whole business—as there is bound to be wherever a department inspects and accepts or rejects the product it produces itself. It is questionable if the city gets the aggregate as cheaply as though it bought it in the open market from men whose financial responsibility would guarantee the quality of the material. And concerning the quality of this county and municipal aggregate grave doubts have been expressed, especially since the city has had to appropriate something like $300,000 for the repair of concrete bridges. It would be of general interest to know just how much responsibility for these repairs should be laid to the quality of the aggregate used.

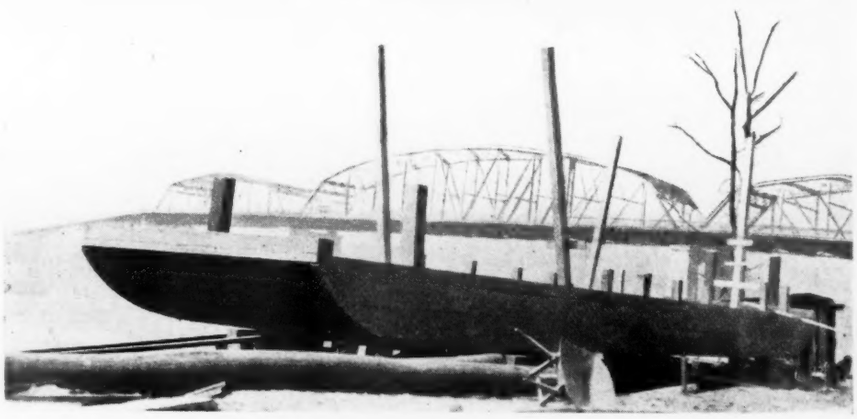
Gravel is very largely used as coarse aggregate in commercial work in Nashville and these companies are dredging it from the bars of the Cumberland. T. L. Herbert & Sons are still using a "pump boat," the W. T. Hardison Co. employs a bucket line or ladder dredge, and the Nashville Builders Supply Co. has a derrick boat with a clamshell bucket. From the fact that the Herbert Co. is planning to use derricks and clamshells on its new dredge it would seem that those most acquainted with the bars of the Cumberland think this the best type, but W. T. Hardison says he thinks he will stick to the bucket line in the new dredge he is planning.

The new Herbert dredge will be novel but the design is one that has been carefully considered. There will be two derricks and clamshells, a set of vibratory screens, and a new device which the company has worked out for cleaning the gravel free from trash such as sticks and leaves. The device is being patented, but the writer feels he violates no confidence in saying that it makes use of a familiar principle employed in washing phosphate rock, the device being one in which the gravel is moved against a flowing current of water which carries the sticks and trash in an opposite direction.

A voyage of twenty miles down the Cumberland on the Herbert company's new tow boat, the "Harvey," on a fine spring morning was a rare treat. This boat has made quite a sensation in marine circles as she is the first stern-wheel tow boat to be equipped with full Diesel engines. She is beautifully built with a steel hull and is fine enough for a yacht. The mechanical details were all worked out by Harvey Herbert, who is a mechanical engineer, and were worth some study. It was noted, for example, that the rudder posts swung in ball bearings, and that the pinion and gear by which the big stern wheel was driven were kept in engagement by an adjustable roller. The boat can handle four barges holding nearly 300 tons each against a four-mile current and the engines can be stopped, started, and reversed under full load quite as easily as though they were steam driven.

The W. T. Hardison Co. is putting up a fine handling and storage plant for sand and gravel, unique in that it has three belt conveyors in parallel in a very substantial steel frame. It has also installed a new steel stiff-leg derrick with 90-ft. boom and a concrete hopper for feeding the conveyors. A description of this plant appears elsewhere in this issue.

One of the Hardison fleet of tow boats



Type of barge or scow used in the Hardison fleet

Colonel Pratt Ends Service with North Carolina Geological Survey

ACCORDING to *Natural Resources,* of the North Carolina Geological and Economic Survey, Col. Joseph H. Pratt, who has been state geologist since 1906, has resigned from the position. His resignation was due to the passage of a bill by the North Carolina legislature. Accepting Colonel Pratt's resignation, Governor Morrison wrote:

"It is with deep regret that I accept your resignation as state geologist and director of the Geological and Economic Survey of our state.

"I am sure that few men in our generation have rendered this state greater service than you have during the 19 years you have filled the position from which you have just resigned.

"I deeply appreciate your very great service myself, and I am sure the intelligent citizenship of the state does also. The studies and surveys you have made of the state's resources will continue to be a source of strength and help to the state for many years to come.

"I think the act of the last general assembly to which you refer, which was passed on the last day of the session, must have been enacted without much consideration by the body. In my judgment it was a mistake, and I regret very much its enactment.

"Wishing you much success in your new field of endeavor, and again assuring you of what I believe to be the deep appreciation of the state for your great service to it, I am,

"Very truly your friend,

"(Signed) CAMERON MORRISON."

Brent S. Drane has recently been appointed state geologist.

On the Constitution and Burning of Artificial Portland Cements

Part IV. Possible Reactions Between Alumina and Lime

By J. E. Duchez, Engineer
Authorized translation from the French Revue des Materiaux de Construction
by C. S. Darling

THE aluminates which can be formed by the combination of alumina and lime during burning correspond to the following:

Monocalcic aluminate .... Al_2O_3CaO
Bicalcic aluminate .....Al_2O_32CaO
Tricalcic aluminate .....Al_2O_33CaO

and the intermediate aluminates, $2Al_2O_33CaO$ or $3Al_2O_35CaO$ corresponding to $Al_2O_31.5CaO$, or again $2Al_2O_35CaO$, corresponding to $Al_2O_32.5CaO$.

Cross section of aluminate crystals

[These are of Al_2O_33CaO, showing the crystals of double refraction of the orthrombic system. The black mass in which the crystals are held corresponds to the translucent porcelanic mass]

Studies of Calcium Aluminates

The monocalcium aluminate obtained by the fusion of a molecule of Al_2O_3 for a molecule of CaO gives a fused mass of great hardness crystallizing in the cubical system.

Reduced to fine powder and moistened with water it sets rapidly and there appears on examination under the polarizing microscope an aureole of transparent product forming around the grains. After 15 or 20 minutes crystalline needles form in the aureole which surrounds most of the grains and these needles develop continually from this time. It is noticed also that these same needles of prismatic form are double refracting and reach as much as a millimeter in length in the free places where they form separately, or promiscuously, radiating from a central point. They have, however, nothing in common with the needles which are noted in the cements of normal composition and obtained by incipient fusion; those have a fine point at the extremity and act differently in polarized light.

THE publication of this and the remaining numbers of this series had to wait until the authorization of the translation had been received from France. M. Duchez has not only been kind enough to revise and review the translation of his articles but offers for publication in the near future his studies of lime burning, to be published simultaneously in the French Revue des Materiaux de Construction and Rock Products. In the present number M. Duchez treats of the lime alumina compounds from his own research work. The importance of these articles to cement manufacturers and chemists can hardly be overestimated, as the subject matter is new, and these are the first authorized translations to be published in America.—Ed.

At the same time that these fine needles are formed on the plate there are noticed here and there the formation of small spherical bodies composed of fine needles which seem to radiate in all directions from a central point.

At the periphery of these clusters, or spherulites, are distinguished the formation of thick and less transparent layers which form at the same time as the crystals and at places take an elliptical form. These spherulites are identical with those which are noted in the underburned cements.

Toward the second hour of setting there is formed in the entire field of the plate a transparent gelatinous mass such that the remaining crystals become practically invisible.

The surfaces of contact of the fine needles which become thoroughly mixed are numberless and insure an intimate adhesion of the crystals; the voids are thoroughly filled by the gelatinous mass which assures perfect cohesion. All these phenomena explain the notable strength of monocalcium aluminate observed by O. Schott *(Tonindustrie-Zeitung,* 1903, 1884) and pointed out by M. Bied *(R. M. C.* No. 139, 1921).

If the amount of lime is increased to 1.5 molecules of lime for one of alumina we obtain the tricalcic bialuminate, $2Al_2O_33CaO$,

Section of hydrated crystals

[These are of the aluminate $2Al_2O_3$ $3CaOaq$. (1) Hexagonal lamella of $Al_2O_33CaOaq$; (2) Fine isolated needles of hydrated alumina; (3) Spherolites of calcium aluminate. The white mass which forms the base of the plate corresponds to the gelatinous mass]

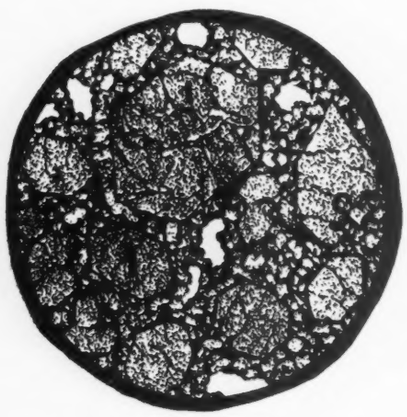
or $3Al_2O_35CaO$, which, like the former product, gives after fusion a slightly translucient fused mass of porcelanic appearance. Cut into thin slices, it shows crystals of double refraction very energetic and belonging to the orthorhombic system, which clearly differentiates them from the preceding and from the monocalcic aluminate, which crystallizes in the cubic system.

Pulverized and moistened with water, this aluminate acts little differently under the microscope from the preceding Al_2O_3CaO. The spherulites are as numerous, while the fine needles are formed only separately. The gelatinous mass separates under similar conditions.

After about the fourth hour there are

noticed in many places in the field clusters of hexagonal lamella similar to those encountered in the hydration of cements and pozzulanes. (See cuts on this page.)

Keisermann has indicated that if in the preparations lime water is used in place of pure water, the hexagonal lamella noted above are formed almost immediately at the beginning of the hydration, which seems to indicate that the presence of excess hydrated lime has an importance from the point of view of the rapidity of the formation of these lamella, and hence of the



Section of portland cement clinker

[Showing crystals of $SiO_2 3CaO (SiO_2 + 2CaO + CaO)$. The black mass in which the crystals are set corresponds to the porcelanic mass which characterizes tricalcic aluminate and the ferrites of lime]

mixture of the crystals and consequently of the setting.

In fusing two molecules of lime with one of alumina the bicalcic aluminate is obtained:

$$Al_2O_3 + 2CaO = Al_2O_3 2CaO.$$

The fused residuum retains its porcelanic appearance, but the translucency disappears, and the mass remains opaque and takes a bluish white color.

Pulverized and moistened with water, this aluminate acts in exactly the same manner as the preceding, except that the needles, as well as the spherulites, are less numerous, while the greater number of hexagonal lamella make it difficult to observe the other crystals outside the gelatinous mass already noted.

M. Le Châtelier has remarked that the preceding aluminates permit the alumina to dissolve in an excess of water and he has observed that in adding lime water to the liquor, the crystallization was immediate and that no alumina whatsoever remained in solution. This observation and that of Keisermann, noted above, have an importance from the point of view of the setting of cements. We shall return to this subject later.

If we increase the amount of lime until it is between two and three molecules for one of alumina we obtain $2Al_2O_3 5CaO$, or tricalcic aluminate, $Al_2O_3 3CaO$. For these two aluminates we see the double refraction crystals disappear in the fused product and for the composition, $Al_2O_3 3CaO$, the thin slices cease to act under polarized light.

We notice in the hydration of the aluminates with more than two molecules of lime and up to three molecules the formation of the same hexagonal lamella described for the dicalcic aluminate, but they are more numerous, and form in all directions instead of lying flat.

With the tricalcic aluminate, the gelatinous mass almost completely disappears, and there is formed exclusively hexagonal lamella formed in all possible directions and united to one another about a central point, forming thus spherical figures or groups.

Gino Gallo *(Tonindustrie-Zeitung,* No. 10, 1909) remarks the formation of the same hexagonal lamella in the hydration of the weakly basic aluminates when lime water is added to the solution.

The formula of the crystals of aluminate of lime has been determined by M. Candlot, corresponding to $Al_2O_3 3CaO aq.$, M. Le Châtelier considers it the only hydrated aluminate stable in the presence of an excess of lime, and consequently the only definite hydrated aluminate of lime to be met with in cements after hardening.

If we again increase the amount of lime in the fusing mixture the aluminates formed with more than three molecules of lime are unstable. They slake and swell like lime without hardening and this is especially true when $Al_2O_3 4CaO$ is passed.

Conclusions on the Study of Calcium Aluminates

From the foregoing studies we see that the calcium aluminates included between $Al_2O_3 CaO$ and $Al_2O_3 3CaO$ harden after being pulverized and moistened. The mixtures richer in lime swell and slake like lime without hardening.

M. Candlot has indicated that the formula of hydrated aluminate of lime corresponds to $Al_2O_3 3CaO aq$, or the direct hydration of tricalcic aluminate:

$$Al_2O_3 3CaO + aq = Al_2O_3 3CaO aq.$$

Now we have seen that the aluminates less basic than the tricalcic aluminate in the presence of water permit the precipitation of hydrated aluminate of lime and permit the solution of alumina in variable quantities.

We can admit therefore that in the hydration of the calcium aluminates there is formed a quantity of tricalcic aluminate for the total quantity of lime, and there remains in solution a quantity of alumina in the form of hydrate of alumina, unless the quantity of lime is sufficient to saturate all the alumina in the form $Al_2O_3 3CaO aq$.

The formulas of hydration would then be of the form

$$x(Al_2O_3 nCaO) + aq = \frac{xn}{3}$$

$$(Al_2O_3 3CaO)aq + \frac{x}{3}(3-n)Al_2O_3 aq$$

the maximum limit being $n=3$.

$$x(Al_2O_3 3CaO) + aq = x(Al_2O_3 3CaO)aq$$

for which the quantity of hydrate of alumina liberated is equal to zero.

The phenomenon of the hydration of the aluminates of lime must be produced, as Zulkowsky has indicated, by the separation of the hydrate of lime and the hydrate of alumina from the aluminate.

$$x(Al_2O_3 nCaO) + aq = xnCaOaq + xAl_2O_3 aq$$

But these hydrates cannot remain in these forms and there must be rapid and constant fixation of the molecules among themselves up to the saturation of all the hydrate of alumina in hydrate of lime $\frac{xn}{3}(Al_2O_3 3CaO)aq.$, the balance of the hydrated alumina remaining free but subject to reaction with a fresh quantity of hydrated lime.

Gino Gallo has indeed shown that the hydrate of alumina thus liberated was subject to combining with hydrate of lime to form the hydrated tricalcic aluminates. It is therefore quite possible to accept that the hydrated alumina, freed by the hydration of the aluminates less basic than $Al_2O_3 3CaO$ will combine with the hydrated lime freed by the hydration of the silicates or with the

Section of hydrated portland cement

[(1) Long needles of $SiO_2 CaOaq$; (2) Spherolites of aluminum hydrate and hydrated alumina; (3) Crystals of $SiO_2 2CaO$, which have not yet been submitted to the action of water. The white mass corresponded to the gelatinous mass resulting from the hydration of silicates and aluminates. The black mass represents the gelatinous mass of aluminates and ferrites of lime not yet hydrated]

free hydrated lime of the cement.

We notice in the study of the aluminates that the final set is as much more rapid as the aluminate is less basic and for the aluminates with three molecules of lime that the beginning of the set is as much more rapid as the aluminate is of more recent manufacture.

We notice equally in the hydration of the aluminates with less than three molecules of lime that the addition of hydrated lime increases the rapidity of the set and that on the contrary the set is retarded by the addi-

tion of hydrated lime to the tricalcic aluminates.

All these facts can be explained theoretically as follows:

The hydration of the monocalcic aluminate examined under the microcsope shows first the formation of spherulites and scattering needles in the field of the plate. We infer from this that from the beginning of the hydration there must be produced a decomposition of the aluminate followed by the continuous formation of unstable aluminates of lime with less than three molecules of lime, then the saturation with lime of these unstable aluminates thus formed with the separation of isolated needles of hydrated aluminates very low in lime.

The movement and the changing of the crystals must be accomplished at the moment of the appearance of the hexagonal needles which characterize the definite formation of the hydrated tricalcium aluminate, the only definitely stable one, and at the moment of the appearance of the gelatinous mass of hydrated alumina.

$$x(Al_2O_3CaO)+aq=\underbrace{\frac{x}{3}(Al_2O_3 3CaO)aq}_{\text{hexagonal lamella}}+\underbrace{\frac{2x}{3}Al_2O_3aq}_{\text{scattering needles and gelatinous mass}}$$

We have indicated that in the mixtures of hydrated lime and hydrate of alumina the formation of the hexagonal lamella was immediate and we have noted that in the hydration of the aluminates more basic than Al_2O_3CaO the formation of these hexagonal lamella was equally more rapid and the appearance of the spherulites and the needles more rare, to disappear almost completely when the aluminate reaches $Al_2O_3 3CaO$.

The disappearance of the needles and the spherulites in the plate is produced also if hydrated lime is added to the fused mixtures less basic than $Al_2O_3 3CaO$, while the appearance of the gelatinous mass is no longer noted, or at least only slightly.

$$x(Al_2O_3 2CaO)+aq+CaOaq=\underbrace{\frac{2x}{3}(Al_2O_3 3CaOaq)}_{\text{hexagonal lamella}}+\underbrace{\frac{x}{3}(Al_2O_3 3CaO)aq}_{\text{hexagonal lamella}}$$

$$\underbrace{\frac{2x}{3}(Al_2O_3CaO)aq}_{\text{hexagonal lamella}}+\underbrace{\frac{x}{3}(Al_2O_3 3CaO)aq}_{\text{hexagonal lamella}}=\underbrace{x(Al_2O_3CaO)aq}_{\text{hexagonal lamella}}$$

There would be the same final result from the direct hydration of the tricalcic aluminate

$$x(Al_2O_3 3CaO)+aq=\underbrace{x(Al_2O_3 3CaO)aq}_{\text{hexagonal lamella}}$$

These two formulas of hydration seem to confirm observations under the microscope. We merely notice with physical experiments that the set is more rapid for $x(Al_2O_3 2CaO)+CaOaq+aq$ than for $x(Al_2O_3 3CaO)+aq$, and that the setting of $x(Al_2O_3 2CaO)+aq$ without the addition of hydrate of lime is less rapid than that of $x(Al_2O_3 2CaO)+CaOaq+aq$ or the same bicalcic aluminate with the addition of hydrate of lime.

The explanation must be as follows:

In the hydration of the aluminates the set must take place at the same rate as that of the decomposition which liberates, at the same time as a molecule of alumina, the number of molecules of lime which are combined with it. As the final result must be $Al_2O_3 3CaOaq$, each molecule of alumina must await the liberation of three molecules of lime to form a molecule of hydrated tricalcic aluminate unless it finds elsewhere than in the aluminate the molecules of lime which it lacks.

We shall therefore have a certain rate of set if the hydrated tricalcic aluminate must be formed at the rate of dissociation of the hydrate of lime and the aluminate in hydration, and a greater rapidity of set if the molecules of hydrated alumina find themselves immediately in contact, as rapidly as the dissociation takes place, with a sufficient number of molecules of lime to form $(Al_2O_3 3CaO)$ aq.

Whatever the aluminate of lime may be during hydration, the dissociated hydrate of alumina will always have a greater affinity for the dissociated hydrate of lime of the same aluminate than for hydrated lime from another source, because the contact of the molecules is more perfect.

Therefore in the hydration of the tricalcic aluminate the addition of lime would have no modifying effect in the method of hydration of the aluminate, the reactions of the hydration being produced separately for each of them, but would merely retard the set by the presence of large hexagonal crystals of hydrate of lime which will hinder the development of the hexagonal lamella of tricalcic aluminate. The addition of hydrated lime to tricalcic aluminate will therefore always have the effect of retarding the set and decreasing the strength.

If the aluminate in hydration is less basic than $Al_2O_3 3CaO$, the addition of hydrate of lime will always have other effects. There will be at first a reaction between the molecules of alumina and hydrated lime of the aluminate and the reaction will be completed up to three molecules of lime by borrowing from the added hydrate of lime.

Take, for example, the monocalcic aluminate and assume that the molecule hydrates in a certain time, without being exact, and that the speed of hydration from one molecule to the other occurs in the same period of time.

From the beginning we shall have $Al_2O_3 CaO+aq=Al_2O_3aq+CaOaq$ and each time it will be the same; it will require therefore three times to obtain the three molecules of lime necessary to the formation of $Al_2O_3 3CaOaq$.

Three times $(Al_2O_3.aq+CaOaq)-(Al_2O_3.3CaO)aq+2Al_2O_3aq$, while if the reaction is produced in a medium of hydrate of lime, for example in the presence of two molecules, we shall have directly from the beginning the reaction:

$$Al_2O_3.aq+CaOaq+2CaOaq=Al_2O_3.3CaOaq.$$

These reactions and the time necessary for them are evidently imaginary, but they approach the reality of the mechanism of the true reaction, and the result of the addition of hydrated lime to aluminates less basic than Al_2O_3CaO will always be shown as an acceleration of the time required for set.

These facts do not contradict the experiments of M. Candlot, who notes that the quantity of lime to add to a cement to obtain a retarding of the set must be correspondingly greater as the cement is more aluminous. There is smiply a new fact, which is that, according to the quantity added, there may be acceleration, though M. Candlot seems to indicate only retarding effects on the set. In any case the experiments we have made of adding hydrated lime to aluminous fused cement have always shown an acceleration of the set, and the same is true for the addition of calcium sulphate (*1); and to note a retarding of the set it is necessary to greatly increase the quantity of hydrate of lime over that necessary to the formation of $Al_2O_3.3CaOaq$. In normal cements the tricalcic aluminate must exist in the cement in order that hydrated lime should show a retarding effect; therefore if a cement has not been properly burned aluminates less basic than $Al_2O_3.3CaO$ may be formed and the time of set becomes more rapid because of free lime in the cement. This explains the differences in time of set according to the temperature and time of burning of the cements of Domme (Dordogne), which have a rapid set when underburned and a fairly slow set when overburned.

We have seen before how important was the influence of burning on the constitution of the silicates and we now see that the formation of the aluminates also supports M. Hendrickx's theory of the importance of controlled burning. With fixed kilns it is impossible to assure regularly the same temperature and the same time of burning which will assure the constant formation of the same aluminates for the same cement plaster. The rotary kiln retains here all its advantages when it is a question of cements obtained by incipient infusion.

(*1) Experiments of the same sort made by M. Brissaud, of the "Forces Motrices de l'Agout," have always shown that the addition of hydrated lime increased the rapidity of set of the fused cements of Luzieres (Tarn) in which the aluminate is always under three molecules of lime. These cements are known under the classification of "electro-cement."

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Beautiful Sandstone Not Sandstone at All

A VICTORIAN stood on the corner of Belleville and Menzies streets watching the men at work on the new Canadian Pacific railway terminal building now under construction. The pillared structure of gray stone appealed to him as an artistic contribution toward the beauty of Victoria's water portal. Turning to John H. Alexander, who is supervising the construction work on behalf of the company, he asked: "Where are you obtaining the sandstone?"

Mr. Alexander, a Scot who hides a sense of humor behind a solemn exterior, replied in rich brogue: "Come on down to the basement and you'll see." And so they went down to where workmen were busy in the half-gloom underneath the building, and there the inquisitive citizen discovered the answer to the riddle, "When is sandstone not sandstone?" He found, to his amazement, that the stone which he admired from the street was a synthetic product. Instead of the stone being hauled to the site in hefty lumps it was manufactured right there in the basement from material which arrived in sacks.

The imitation sandstone consists of a concrete base faced with material made from pulverized marble, two grades of pulverized granite and portland cement and white cement. These ingredients are mixed by hand into a grey compound which is considerably darker than in the finished product. There is no cutting necessary in connection with this artificial stone, the blocks, ornaments, etc., being cast ready for use.

The facing material is tamped into the mould to a depth of 1 in., and then the concrete, a 4-to-1 mixture, is tamped in on top until the mould is full. When this operation is completed the mould is taken apart and the block of "stone" set out to harden.

The outstanding advantage of the artificial stone is, of course, its cheapness as compared with the natural sandstone. Had real stone been used in the building, the structure would have cost $325,000, as compared with $175,000 for which it is being erected.—*Victoria (B. C.) Colonist.*

It is just such ways as the above that an enormous tonnage of cement—in the aggregate—is accounted for. Few realize that "concrete products" account for fully as large a tonnage as concrete highways.

Pacific Portland Cement Company's Expansion

AN offering of additional shares in the Pacific Portland Cement Co., Consolidated, on the basis of increasing the capitalization from 60,000 shares of $100 par stock to 100,000 shares of no-par stock and the sale of these 40,000 new shares to stockholders at $50 each was recently announced by Robert B. Henderson, president.

The expansion campaign carried on by the company during the past year is given as the reason for the additional financing. The plaster plant at Gerlach, Nev., of 500 tons per day capacity will involve a total expenditure in excess of $1,500,000. Another plaster plant in Southern California will cost about $1,250,000.

In order to add to its cement output the company has purchased 30,000 acres of tideland oyster shell beds in the south arm of San Francisco bay and has under construction a mill at an initial capacity of 2500 bbl. per day at Redwood City harbor.

The total cost of improvements and additions is given as about $1,500,000 and the directorate has decided that a new stock issue is the best method to raise $2,000,000 of additional capital. A special meeting of stockholders has been called for May 23 to ratify the plan under which they will be offered two new shares for each three shares now held.

Seattle to Test Relative Fire-Resisting Qualities of Clay and Concrete

THE fire resisting qualities of clay and concrete tile will be tested by a committee of five engineers as a result of a meeting of the majority of the members of the city building code revision commission held in the offices of the city superintendent of buildings recently.

An ordinance recently presented to the public safety committee of the city council provided for the use of concrete tile in certain building construction. Objection on the part of clay products men to the passage of the ordinance resulted in a request for advice from the code revision commission. After a lengthy hearing by the commission members in which arguments from those advocating the passage of the measure and those opposing its passage it was determined that a fire test of clay and concrete tile be made. The following motion carried:

"The Portland Cement Association and the clay products interests shall each choose an engineer; each of these shall choose an additional engineer and the four shall choose a fifth. The five shall plan and conduct a fire test comparing the fire resistance of clay tile and concrete tile.

"Half of the expense of the test shall be met by the parties interested in concrete tile and half by those interested in clay products.

"A complete report of the relative fire resisting qualities of the two materials and the adequacy or inadequacy of the fire resisting qualities of each shall be submitted by the committee to the building code commission within 60 days."

It is considered probable that a structure will be erected, half of the walls of which will be of concrete tile and the other half of clay tile and then filled with inflammable material and ignited. The city fire marshal will supervise the test.—*Seattle Journal of Commerce.*

Gives Directions for Plastering

A CIRCULAR telling how plastering is done, and in many cases why it is done in a certain way, has recently been published by the Bureau of Standards. It is the result of a three years' study of the plastering industry, during which many experts on the different phases of the subject have been consulted.

The practical part of the paper gives directions for preparation of a masonry wall to receive plaster, specifications for lath, directions for erecting lath, specifications for the ingredients of plaster and directions for their mixing and application.

The properties of plastering are discussed in detail, and conclusions drawn as to the best kind of plaster to be used for a given purpose. Some of the common defects are explained and their remedies suggested.

These directions are embodied in Circular 151 of the Bureau of Standards entitled "Wall Plaster: Its Ingredients, Preparation and Properties." Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 15 cents cash.

Valley Sand and Gravel Corporation's New Plant

THE EDITOR: In our article in the March 22 issue of ROCK PRODUCTS there was, without intention on our part, no mention of the Thomas hoist as being a part of our equipment.

As with all other excavating equipment, the writer appreciates that the power unit is in a large measure responsible for the success or failure of the cableway.

With full appreciation of the value of the cableway in our operation we cannot, with justice, neglect so important a part of our equipment as our Thomas hoist, which furnishes the power for our cableway operation.

As with our other equipment, it has been operated with high efficiency at a very low maintenance cost, and has given us excellent and satisfactory service.

H. A. STELLEY

Avon, N. Y., April 2, 1924.

A Shaft Lime Kiln Designed for Retarted Combustion of Coal Gases

Furnace Built on Gas-Producer Principles and Kiln with Air Inlets Above the Eyes for Progressive Combustion of Gases in Kiln

By John C. Schaffer
President, Schaffer Engineering Co., Pittsburgh, Pa.

IN calcining limestone it is necessary that the rock be subjected to certain conditions, consisting chiefly of a mild, highly humidified heat at a relatively low temperature, in order to obtain a high class product of calcium or magnesium oxide, and the subsequent hydroxide or hydrate. In order to obtain these conditions, it is necessary that a kiln be so constructed, first, that it will conform to the requirements in producing them; second, that the heat-generating facilities have features for controlling and maintaining the conditions constantly.

It is necessary that the raw material be first subjected to a gradual heating and at the same time be surrounded by a humidified atmosphere containing certain chemical elements. This is what I call an "acidulating" condition. The highly humidified gases from the combined products of combustion condense and precipitate when coming in contact with the cold stone, and attack the stone to the extent of starting decarbonization and preparing it for receiving the heat, and for the free removal of the carbon dioxide. The action of the acid in penetrating the stone breaks down the thin films that close the small voids between the grains of the stone, making it porous instead of more or less impervious as before this treatment.

"Preheating and Acidulating Treatment"

A section of the kiln is especially designed to facilitate this action. This section of the kiln I call the "preheating and acidulating section."

There is a choke or restriction at the termination of this section which carries a large proportion of the weight of the limestone over it and relieves the pressure from the material in the section of the kiln below known as the "calcining section."

In order to obtain the best results in removing carbon dioxide without the use of excessive temperature, it is necessary that the stone be treated as above described; that is, heated gradually and progressively in a section of the kiln where it may rest in a comparatively loose condition and have free room for expansion. It is also necessary in this section to have channels for the heat to surround the stone and pass upward and be free of any back pressure or draft choke. There should be sufficient draft to carry away the carbon dioxide freely as it passes out of the stone, for the heated stone retains an affinity for the carbon dioxide. The carbon dioxide will also increase the pressure and retard the passing off of the carbon dioxide still left in the stone. If unbalanced pressure conditions are maintained, a low-temperature heat will remove the carbon dioxide more rapidly than a high-temperature heat at a pressure equal to atmospheric pressure surrounding the stone.

EDITOR'S NOTE

THE lime kiln described by the author is held by him to have the following special features:

(1) Allows for 24 hours' storage capacity of limestone—without choking the draft.

(2) Permits pre-calcination treatment of this stored stone with carbon dioxide and water vapor (carbonic acid).

(3) Provides a calcining chamber so designed that the weight of overlying stone is partially relieved.

(4) Provides a sealed cooling chamber designed to complete the calcination process with the heat contained in the lime.

(5) Has a special furnace for retarding complete combustion.

(6) Has air inlets over the eyes to provide oxygen for combustion in the kiln.

(7) Can be drawn satisfactorily by the "slipping" method instead of the more common "sticking" method.

Large Storage Provided

The shape kiln to produce these conditions is unusual and requires special features in the top section to carry them out. In order to obtain the results in acidulating the stone, it is essential that the size of this section be sufficient to contain a quantity of raw material that will give at least 12 hours—preferably 24 to 30 hours—from the time the raw stone enters the kiln until it passes through the choke or into the next section.

This quantity of cold stone in an ordinary lime kiln would be sufficient to choke the draft and render it impossible to obtain the necessary conditions in the calcining chamber, as described above. To overcome this, unique draft facilities have been provided in the way of a series of checkered inlet chimneys in the lining of the "preheating and acidulating section" of the kiln that connect directly over the "calcining section" and lead a certain proportion of the gases up through the wall. These flues in the walls of the kiln maintain a warmth which acts as an accelerator for the gases passing up through the cold stone and to the stacks located on top of the kiln. In this manner the necessary draft conditions can be maintained, and at the same time it is possible to carry as high as 24 to 30 hours, raw stone supply in the acidulating chamber.

As the stone passes from the acidulating chamber, the choke, or restriction, is designed to cause the pieces of stone to turn over, and to change places and shift their positions in the kiln in such a way that the greater part of the large stones goes to the center and a large portion of the small stone to the outside, where the voids are the largest owing to the stone resting against a smooth surface. The disturbing of the travel of the stone at this point causes it to pass down in a thin column between the eyes, and permits of the flame entering through these eyes from the fire box to be distributed evenly through the entire mass.

This section of the kiln, as above stated, is known as the "calcining section" and it terminates at the bottom of the eyes leading from the fire boxes.

"Fireless Calcining Chamber"

The next section is known as the "fireless calcining and cooling section." When the lime passes into this section it is of a temperature ranging from 1600 to 2000 deg. Fahr., and if certain conditions are maintained it will continue to give off carbon dioxide until the temperature has been re-

duced to a point approximating 1400 deg.

Owing to the special features of this kiln, conditions are produced that will permit of a very gradual cooling. This makes possible the passing of the lime down by the eyes still containing, comparatively, a large percentage of carbon dioxide, and removal of this with the heat retained in the lime after it passes the "calcining section." In addition to the saving in fuel accomplished through this, the lime is not injured, as it is by the old method of remaining in front of the eyes, where it receives an excessive quantity of heat after the carbon dioxide has been removed. In order to obtain this condition fully, it is necessary to have a cooler and fireless calciner combined of not less than 12 hours' capacity, and preferably 24 to 30 hours.

Exhaustive tests have disclosed that with a "fireless calcining and cooling section," as described, it is not necessary to heat lime to a high temperature, nor is it necessary to use the old practice of sticking a kiln to draw it, if the point where the eyes enter the kiln is so constructed that the lime will not lodge in the eye.

Drawing by "Slipping" Instead of "Sticking"

These same tests disclosed that by operating under these conditions and drawing the kiln at short intervals, as, for instance, every hour instead of every four to six hours, as has been the old practice, the capacity of the kiln is approximately doubled and the quantity of fuel is reduced about 30%. A very important feature is the improvement in the quality of the lime produced. The old method of operating the draw shears by hand and the old type of shears have retarded operation to a considerable extent. It has been found that a specially designed duplex shear, operated by compressed air, with the controlling valve conveniently arranged for the man making observation in drawing, has added greatly to the efficiency of these kilns and is embodied in the design and construction of the kiln described.

The features embodied in the "fireless calcining and cooling section" are such that the lime when leaving the kiln is cooled to a point where it only requires a small amount of additional cooling to render it suitable for hydrating, or packing for shipment. The lime as it comes from the kiln is dumped on a grating that has removable sections. Under this grating there is provided a hopper so shaped as to feed the lime on to a conveyor. The hopper is so arranged that an air current can travel through it and pass up through the lime lying on the grating. This current of air readily removes the remaining heat, which heat must be removed before the lime can be delivered to the conveyor. The sections of this grating are so arranged that they can be removed individually and the lime sorted and fed through the opening made by the removal of the grating.

The design of this kiln is such that it can be built in different sizes. For instance, a 13-ft. shell would embody one fire box in each side and one cooler, instead of the double-fire box in each side and the double cooler, as are embodied in the 17-ft. kiln used for illustration.

The top of this kiln is enclosed and provided with simple doors, which can be opened for receiving the stone from an ordinary rocker dump car. The height of the stacks can be regulated to suit the atmospheric conditions of the locality where the installation is to be made.

The lining of this kiln embodies special insulation next to the shell of the kiln, which prevents radiation and at the same time absorbs the pressure due to expansion of the brick lining and prevents bursting of the shell.

Fire Boxes or Heat Generating Facilities

The interior shape and construction of a kiln for calcining limestone are very important, for unless the heat is generated and applied in a scientific manner the construction and the shape will not in themselves produce the desired results.

When wood was universally used as fuel, its heat generating properties were such that it automatically produced heat of a quality required for scientific treatment of limestone while calcining. In changing from wood to coal it was found that the latter did not give the same quality of lime and many attempts have been made to correct the heat produced by coal, so as to give a condition similar to that obtained from wood, with the result that some improvement has been made each year in this connection, but until the development of the Schaffer furnace there had been no furnace having the facilities for producing and controlling a low-temperature, highly humidified, expanded, slow flame with coal. This furnace is the outcome of a large amount of experimenting. This work has resulted in the development of a furnace that will not only generate and produce heat as above described, but is so constructed that the conditions can be maintained very easily and give uniform operation.

The coal or fuel can be fed to this furnace by hand, but the regular operation embodies a simple revolving feeder that discharges the coal regularly down through the front wall of the furnace on to a receiving apron at the front of the furnace.

Automatic-Stoked Furnace

The grates in this furnace are built on the order of a flight of stairs; each section has a plunger that enters between the treads, or at the point that would ordinarily be termed the "riser." These plungers are connected to a shaft that is operated at given intervals by means of a steam or air piston. The operation of the grates causes a movement of the revolving feeder and the discharging of a given quantity of coal. Each time the plungers operate they not only stir the fire from the bottom, but at the same time cause it to progress down the incline. The plunger in the last riser at the bottom is of an open-box form, and each time it makes its travel it removes a certain amount of ashes and discharges them under the grate. The extreme bottom section is hinged and has a separate control for dumping it to remove clinkers and other refuse from the furnace. Means are provided for regulating the travel of the plungers in the grates and the revolving feeder feeding the coal, so as to give a feed in accordance with the requirements.

A tapered ash pit can be used with this furnace, which can be connected to a conveyor or other means for removing the ashes automatically from the furnace. The opening to this pit is sealed by a door, to exclude the air from passing up through at this point. The ash-pit doors under the grates are likewise closed when operating in connection with calcining lime, and the air, together with a correct proportion of steam, is admitted through openings in the front of the furnace. These provide means for controlling the amount of air in proportion to the amount of steam.

Provision for Delayed Combustion

In order to produce a long, humidified, low temperature flame it is necessary not only to have a highly humidified atmosphere passing up through the fuel, but there must be an actual lack of oxygen in the fire box to prevent premature combustion of the gases while they are generating.

There are a number of different gases produced by coal. All of these gases require different conditions for combustion. When there is an atmosphere with insufficient oxygen, the most highly combustible gases will utilize the oxygen available, leaving the lower gases unburned, which would pass out through the stacks unless the required amount of oxygen is supplied later on.

A long flame is caused by the gases burning in their order as they travel upwards. Each gas contained in coal produces certain temperatures when burning. If they all burn together, they will produce a very high temperature. If they burn separately, there is none that will produce the high temperature of that when burning combined. The supplying of the steam and the lack of oxygen up through the fuel bed only permit the highly combustible gases to burn in the fire box and immediately upon entering the kiln. (This action is like that of a gas producer.)

Air Inlets Over Arches

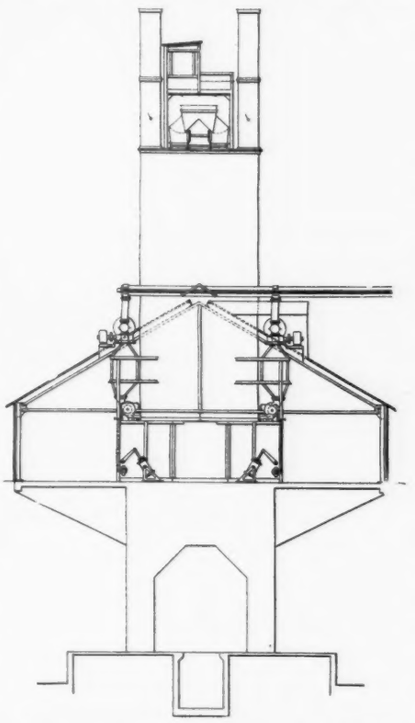
The admission of preheated air through the small channels of the arch over the fire box supplies the necessary air for completing combustion of the gases as they pass up through the kiln and causes the burning of these gases separately, not only giving an ideal heat condition, but at the same time a complete burning of the gases;

and incidentally great economy in fuel consumption, as well as a product of high quality lime. The passages for admission of air through the small channels over the arch have means for regulating the quantity of air. Exhaustive tests have demonstrated that results can only be obtained by admitting air at this point. If air is admitted at the bottom of the kiln, through the draw shears or below the point of the eyes, it has a detrimental effect on the operation of both the heat generative system and the kiln itself.

The large rectangular eyes, forming a heat passage from the fire box to the kiln, conform to the size and shape of the furnace and are in accordance with the requirements for producing a heat as described as being essential for the scientific treatment of the raw material while being calcined. Any obstruction to the free passage of the flame causes eddy currents, which result in mixing with any available oxygen and causes instantaneous combustion. As this is opposed to the conditions desired, the Schaffer furnace is so designed that the flame is delivered into the kiln with the least possible resistance and permitted to travel in a free and undisturbed course. The bottom of the eyes having the same radius as the top makes a large eye possible without giving a condition where the lime passing in front of these eyes rolls into the fire box. The recessing of the bottom of these eyes leaves no surface for lumps of lime to accumulate on, such as in the ordinarily constructed eye. Carrying these recesses with a very slight taper to the point where they intersect the receding slope of the walls of the "fireless calcining and cooling section" causes the lime in front of the eyes to move evenly with the lime farther back in the kiln.

These are very essential features for "slipping" a kiln, instead of heating it to a high point and making it stick above the eyes in order to draw out the lime below. These, together with the new type furnace, also eliminate the loss of time and fuel through stopping to clean fires and the poking of kilns to drop the lime that is lodged above the eyes.

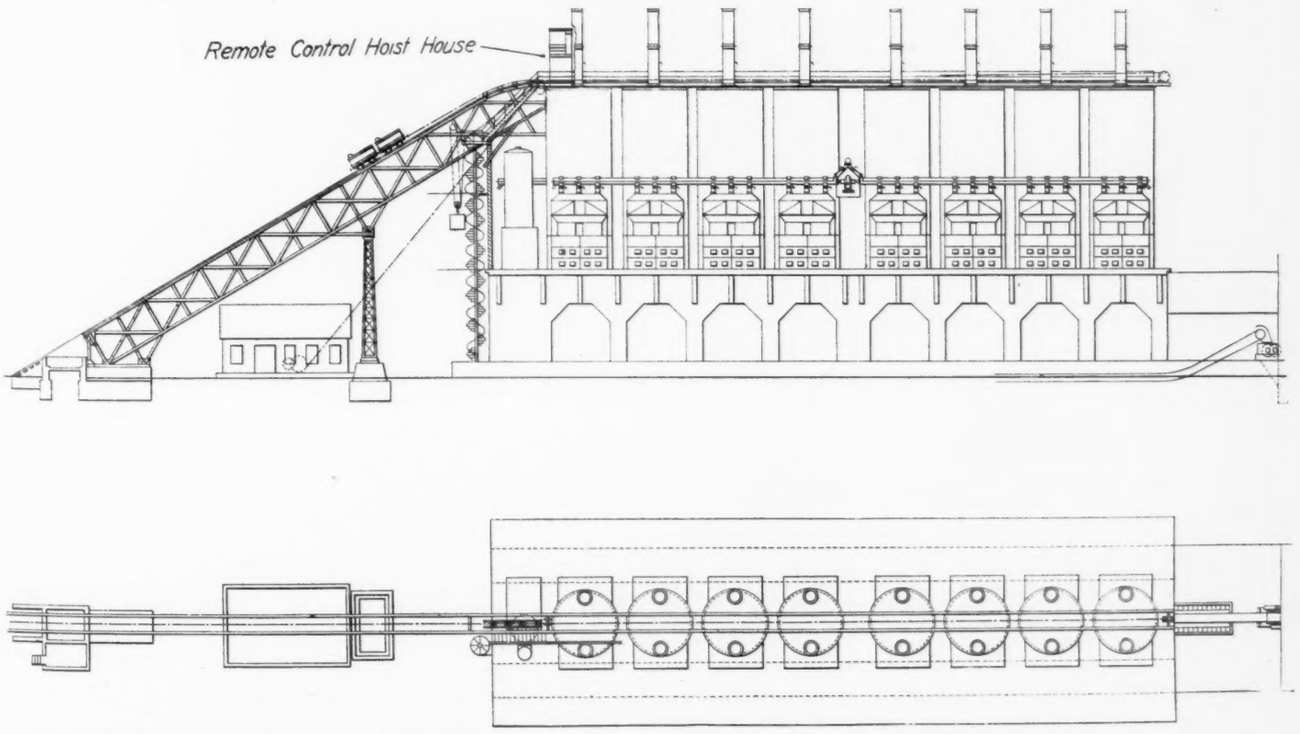
This same furnace and principle can be applied to a rotary kiln and give results far superior to that of other methods used for calcining lime.



Cross-section of plant being built to incorporate the features described in this article

Calcium Arsenate Prospects

A SUMMARY of all information available shows that up to about the middle of January approximately 28,000,000 lb. of calcium arsenate had been contracted for delivery during the coming season, and a limited proportion of this had been actually delivered, probably not over 5,000,000 or 6,000,000 lb., though this figure is a very rough estimate. Judging from experience last year, when the early business approximated 50% of the total season's business, we might expect a final consumption this year of between 50,000,000 and 60,000,000 lb. Everything now depends on the late season demand. It is still too early to estimate just what effect the cold weather has had in reducing the weevil infestation for the coming season, and it is unfortunately true that many farmers are going to wait for the weevils actually to come into their fields before deciding on buying poison, with the hope that the cold weather has been sufficiently severe on the weevils that poison applications will not be necessary.—*Chemical and Metallurgical Engineering.*



Elevation and plan of a battery of lime kilns now under construction—the kilns are designed according to the principles described in this article. Note the location of the blower and system of air inlets over the eyes

Hints and Helps for Superintendents

A Washer That Will Handle Limestone Sands

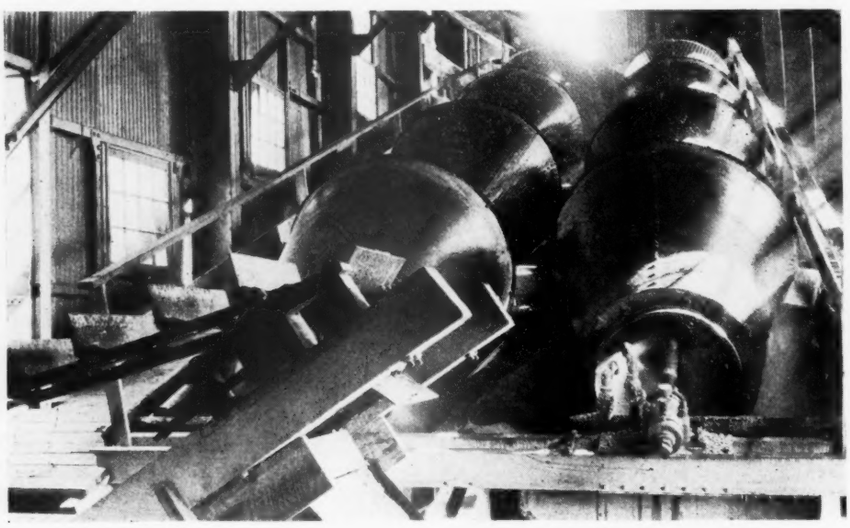
AS everyone who has had any experience with it knows, limestone crushed to a fine mesh size is a very difficult material to wash. It has a considerable cementing power when it is wet, and if it is allowed to stand in any of the ordinary sand settling devices it will form a hard bed that must be removed by a pick.

The Marble Cliff Quarries Co., operates two washers at its plant near Columbus, Ohio, and had a lot of annoying experience with washing the fines before a satisfactory washing device was found. The various forms of automatic discharge settling cones and boxes were all alike in building up a bed that was almost as hard as concrete. Screw washers worked better but could not be allowed to stand. Various forms of rake and conveying appliances were tried but they all came to grief.

Finally the problem was solved by accident. A chain flight conveyor was being installed. It had been intended that it should run in the usual manner with the tight side doing the digging, but through an error it was put in so that the loose side dug the settled material from the bottom. It was found that this permitted the flights to ride over any "humps" of settled sand and in time these humps were worn down so that an even bed was maintained. Moreover the action of the flights in passing through the water gave a gentle aggitation that helped to prevent the sand from packing, although this was not enough to prevent packing in itself when the digging was done by the tight side of the chain.

The picture shows the upper floor of the newer washing and screening plant, with the head of one of the washers in the foreground. The rest of the device is merely a narrow box, about 4 ft. wide and 40 ft. long in which the chain drag runs. The sand and water is admitted about halfway down the length of the box.

These washing boxes were made at the plant from standard flight conveyor parts furnished by the Jeffery Co. They have been in use for a considerable time without requiring more than minor repairs.



Screens and head of sand drag separator in washing plant of the Marble Cliff Quarries Co., Columbus, Ohio

Operating a Quarry in Winter

THE Marble Cliff Quarries Co., of Columbus, Ohio, is one of the comparatively few companies that find it profitable to operate throughout the entire year. In fact, the company feels compelled to do this as its market is an all the year market, especially for flux and chemical limestone.

Recently a ROCK PRODUCTS editor visited the quarry and knowing the difficulties that other companies had found in winter operation, he asked the superintendent, H. R. Welsh, regarding his methods.

"There is no secret in our methods," said Mr. Welsh. "All that one needs to do is to prevent the water pipes from freezing and to use a low-freezing point explosive. We prevent the water pipes from freezing by blowing them out with compressed air, and we have found the low-freezing paint powder to be just as efficient and satisfactory as any other. So we run right along in the winter just the same as in the summer and make no account of the weather."

The picture shows the water pipes at the quarry being blown out by compressed air. A tee and valve is put in the line at a low point and the air is turned in as soon as the shift's work is finished. It takes from an hour to an hour and a half to blow out the lines, and naturally some time is needed for filling them in the morning. In very cold weather it is necessary to give the lines some attention to see that the water does not stand in them long enough to freeze, and of course the valves in the line have to be watched to keep them from freezing shut and bursting.

Mr. Welsh says that blowing out the lines

Blowing out pipes with compressed air to keep them from freezing

is a much better and safer method than trying to keep them from freezing by burying them underground or by using protective covering. All of the lines in the quarry are laid on the ground without any covering to keep them from freezing.

He also says that in an emergency he has used steam to blow out water lines, taking the steam from the boiler of a steam shovel, and found it was possible to keep the lines from freezing by this method. But steam takes longer and is more expensive than air.

Interesting Tests on Blasting

ON Friday, March 14, a very successful blast was set off at the quarry of the Interstate Crushed Stone Co. at Springfield, N. J. This blast consisted of nine holes 70 ft. deep and 6 in. in diameter, each hole drilled about 15 ft. back from the face of the quarry and spaced about 15 ft. apart. Each hole was loaded with 500 lb. of 50% and 40% Atlas dynamite and detonated with Cordeau-Bickford and electric blasting caps. The total charge set off was 4500 lb. in three blasts, each blast consisting of three holes containing 1500 lb. of dynamite.

The results were highly satisfactory both as to the volume of stone produced ready for the crushers and also as to the effect on nearby buildings.

A portable seismograph was set up in one of the green houses of the Springfield Floral Co., situated about 1900 ft. from the quarry, to ascertain what vibration if any was caused by the blast and the records show the vibration was about 0.02 of a centimeter. This is no more than would be caused by dropping a 40-lb. weight from a height of about 3 ft.

Maurice Deutch, of New York City, inventor of a portable seismograph, assisted by Professor Quimby of Columbia University, conducted the tests.

The loading of the holes and blasting was in charge of George Brohan, superintendent of the Interstate Crushed Stone Co., and under the supervision of M. M. Bamberger, president and general manager.

Among those present at the test were A. H. Hammond of the Atlas Powder Co., Mr. Reed of the Chicago Pneumatic Tool Co. and several other quarry operators.

The amount of rock produced is estimated at 18,000 tons, 95% of which is broken sufficiently small to be ready for the 36x30-in. crusher without any secondary shooting.

This quarry has an output of about 100,000 tons of crushed stone per season.

Stone is loaded into Western dump cars by two steam shovels, then hauled by industrial locomotives to the foot of the inclines leading to crushers, up which the cars are pulled by electric hoists.

The drilling is done by a No. 14 Cyclone blast-hole drill and two Chicago pneumatic No. 10 air drills. Crushing is done by one 30x36-in. and two 24x13-in. jaw crushers. There are three belt conveyors and four screens for handling and sizing the stone.

A stiff-leg derrick with an 80-ft. boon, handling a 1-yd. clamshell bucket, is used for stocking and reclaiming stone.

The working force consists of 30 men. The plant is all operated by electricity, using 350 hp., distributed among 10 motors.

Cement Plant to Pump Clay from Pits

A PIPE line nearly a mile long, connecting clay beds with the plant, has been completed for the Manitowoc Portland Cement Co., Manitowoc, Wis., whose $1,000,000 mill will be in operation in about six weeks.

The cement company several months ago purchased a tract from the Wisconsin Central railroad containing large clay deposits which will supply its needs for several years.

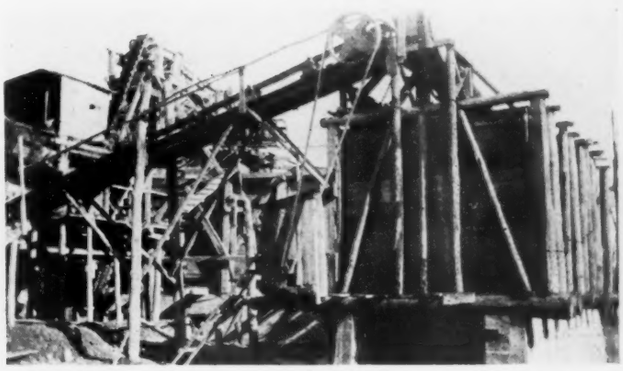
The pipe through which the clay, in 65% solution, will be carried to the plant is 8 in. in diameter. This solution will be forced through the line by a pump. By 1925 the company plans to manufacture 1,000,000 bbl. of cement a year.

Limestone for this plant, it will be recalled, is to come by boat from the quarries in the vicinity of Rogers City, Mich., there being no high calcium limestone in the state of Wisconsin.

Preparing for test blast at the quarry of the Interstate Crushed Stone Co. at Springfield, N. J.

Results of a 9-hole blast set off in three sections of three holes each using in all 4500 lb. of powder

Top of incline from quarry with crushing plant in the background



Crushing plant and loading bins. Note the rather unique construction

New Oranda, Va., Lime Plant of the Palmer Lime and Cement Company

Three Shaft Kilns for Wood and Coal or Either Fuel Alone

MENTION was made of the Oranda plant of the Palmer Lime and Cement Co. in the article in Rock Products, December 29, 1923, describing the new hydrating unit of this company's plant at York, Penn. Since then the Oranda plant has been completed.

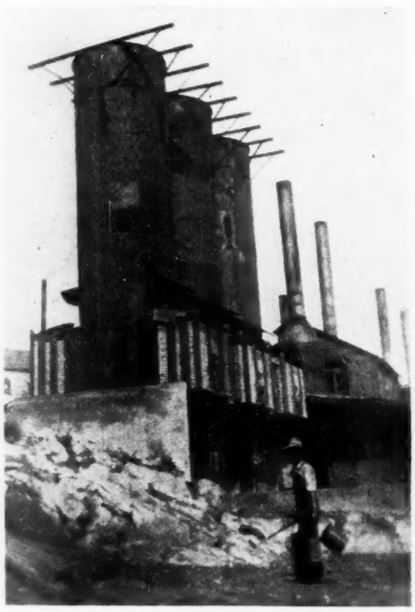
The property has long been known as the Stickley quarries. They were operated at different times by the Baltimore and Ohio R. R. for building stone and most recently by M. M. Orndorff, from whom the quarries were purchased by the Palmer Lime and Cement Co.

On the property were five old-fashioned pot kilns, which had been remodeled from time to time, but from which they were not securing the results that Mr. Palmer felt ought to be secured. Accordingly, it was decided to erect three York shaft kilns, 11 ft. diameter, 50 ft. high, equipped for hand firing and to use wood and coal, or either fuel alone. The kilns are lined to suit the particular kind of limestone that is found at this place, which is a high calcium stone having peculiar qualities for use in the chemical trade. These kilns produce from 10 to 14 tons of lime each per 24-hour day.

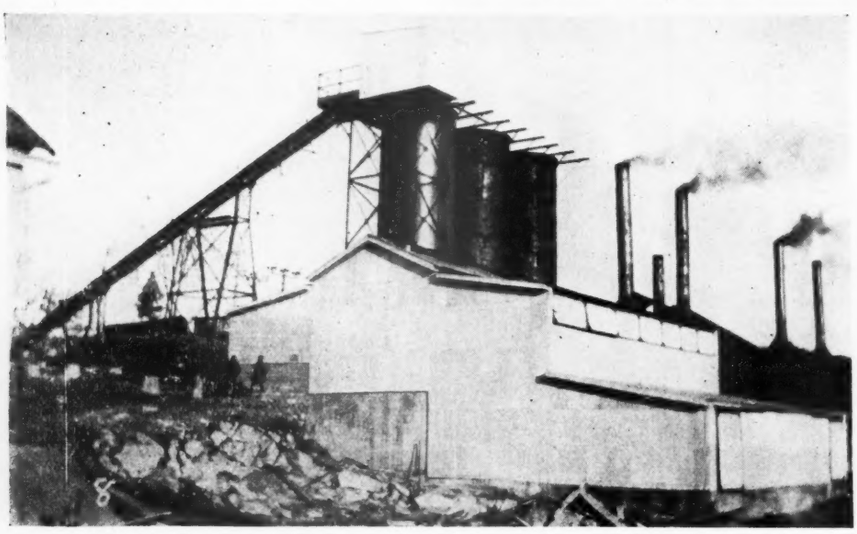
On account of the position of the railroad and the quarry, it was necessary in this installation to put the steel runway incline from the quarry to the top of the kilns at right angles to the kilns. This necessitated the use of a pressed steel turntable at the top of the incline to receive the cars which are drawn up the incline by an electric hoist with a 35-hp. motor, alternating current, fitted in a hoist control house built and supported on a level with the tops of the kilns at the side and rear of the top of the first kiln.

The entire plant is fireproof, with ample head room; ventilation and access openings for fuel and air are provided, together with ample floor storage for sorting the lime. The floor storage is on a level with box-car floors for direct loading into the cars. The plant is in operation at the present time.

The plant represents the composite ideas of Lowell M. Palmer, president, and C. G. King, general manager, of the Palmer Lime and Cement Co., and Wm. J. Kuntz, vice-president and general manager of the McGann Manufacturing Co., York, Penn., who designed and built the kilns.



General view of the kilns at Oranda



Quarry incline at right angles to battery of kilns

Gambling in Chinese Cement

NO American cement company has yet achieved notoriety through speculation in its shares. Indeed, the stock of only one company, the International, is traded in any of the big city stock exchanges. In China, however, according to a newspaper clipping sent by M. H. Chou, of Shanghai, a cement company stock is the vehicle of such speculation.

We are told that a sensational rise has taken place in the shares of the Green Island Cement Co. which is managed by Messrs. Shewan Tomes & Co. Within a very short time these shares have gone up from $26 per share to $43 for cash and $45 for March delivery. Reuter's correspondent, while dogmatizing on the profits this phenomenal rise will bring to some punters, has failed to give the causes promoting this new gambling fever.

In the case of the Green Island Cement Co. the factor which has produced an optimistic sentiment is the offer of the Hongkong Government which is reported to have been made or about to be made to the company to remove its works from the heart of Kowloon to a place called "Gin Drinkers Bay." It is stated that the government of Hongkong is anxious to develop this site on which the works of the cement company are located and is willing to buy it from the company at a fair market value. It offers to sell instead a large plot of land in another part of the colony at a nominal price. Of course, if there is any truth in these reports and if the negotiations are completed to that end, the price of these shares should adjust itself to higher levels.

The fact remains that the Green Island Cement Co. bought its present holding in Kowloon at a very nominal amount many years ago when land in Hongkong did not attain the fabulous price it is commanding today. The area must be valuable.

The Green Island Cement Co. was established in 1889 with a capital of $3,000,000 divided into 400,000 shares with a paid up amount of $7.50 per share. It has reserves totalling $1,000,000. It paid an interim dividend of 50c per share in September last, while its total distribution last year was $2.50 per share. At the price of $26, at which they stood at the beginning of this year, the yield to the investor was 7½%, so that should the rumors which have given rise to such violent gambling in this stock prove falsified the bubble should burst and the price recede back to the old level.

Central West Lime Freight Rates Revised

Important Interstate Commerce Commission Decision Affecting Eastern Competition in Central West Territory—Tendency Toward Mileage Basis

A REVISION of rates on lime, from Mitchell, Ind., to destinations in central territory in Pennsylvania, West Virginia, Ohio and Indiana, has been ordered made, in accordance with a mileage scale prescribed in a report on No. 13014, Lehigh Lime Co. vs. A. C. & Y. et al., opinion 8987, I. C. C. 341, not later than April 19. The Commission found existing rates unreasonable and unduly prejudicial to complainant and unduly preferential of competitors at points in Trunk Line territory. The scale begins with 12 cents for distances of 120 miles and over 100 and runs out at a distance of 700 and over 620, with a rate of 24 cents. The blocks are 20 miles up to 80 and thence 30 miles. Distances are to be calculated in accordance with the rule in Atlas Portland Cement vs. Burlington, 81 I. C. C. 1, as modified.

The Commission's decision is intended to bring about uniformity in rates on lime from Mitchell, Ind. Commissioner Lewis, who wrote the report, said there was no uniformity, although they appeared to be on about the same level as specific rates on lime throughout central territory, but that they were higher, and in some instances materially higher, than rates for similar distances from competing points to central territory and between points in western and southern territories. The rates from Mitchell made by intermediate application, he said, of course, compared more unfavorably than the specific rates.

Common lime, he said, was rated sixtb class in Official Classification territory From Mitchell to central territory, including Indiana, but excluding Illinois, specific rates were published to fewer than 200 points. The rates, he said, varied from 65 to 95% of sixth class, with an average of about 78%. By far the greater number of rates were made by intermediate application. Under that method, he said, the governing point, in some instances was from 75 to 100 miles more distant, the result being an inflated rate at the intermediate point. The rates thus made, he said, averaged a much higher percentage of the class rates than did the specific rates. Points having no specific rates and to which rates could not be made by the rule for intermediate application, he said, took sixth class.

The complainant proposed as reasonable, a scale of rates approximately 70% of sixth class in effect June 24, 1918, plus a general increase of 1.5 cents and plus 40%. That scale, the complainant said, was the result of an exhaustive study of lime rates in all the surrounding territory. The defendants admitted that a uniform basis was desirable, as shown by the efforts made since 1912 to agree upon a uniform basis. They proposed as a substitute rates made 83.33% of sixth class of the scale in effect in 1914, plus subsequent increases, or the sixth class rates in effect June 24, 1918, plus general increases, and to establish from eastern points to central territory rates that would be on the same general basis, distance considered, as the rates from Mitchell.

Commissioner Says Cement Rates "Too High"

Under the proposal of the carriers, namely, 83.33% of sixth class, the rates on lime would be somewhat higher than on cement. The complainant, Commissioner Lewis said, admitted that under a proper adjustment, rates on lime should be somewhat higher than on cement, but contended that the rates on cement in central territory were too high.

After the submission of this case the carriers indicated their intention to make cement rates in central territory on the scale prescribed in Atlas Portland Cement vs. C., B. & Q., 81 I. C. C. 1, which scale was used in making rates in Indiana and Illinois, the last of which went into effect January 5.

The allegation of undue prejudice and preference was based on the fact low rates on lime prevail from Buckeystown, Frederick and Lime Kiln, Md., Bakerton and Eagle, W. Va., Stephens City and Strasburg, Va., and York, Pa., to points in central territory. All the plants mentioned, the commissioner said, were served by the Baltimore & Ohio, except York, which was on the Pennsylvania and Western Maryland. Frederick, he said, was also served by the Pennsylvania. Buckeystown was treated as typical. Summing up about rates on lime from Buckeystown and its conclusions and findings, the Commission said:

Eastern Lime Rates on Different Kinds of Lime

From Buckeyestown to points in central territory east of but including the Mahoning and Shenango Valleys in eastern Ohio different rates are published on certain kinds of lime. To Pittsburgh, for instance, the rate on building lime is 14.5 cents; on agricultural, chemical, or land lime 12.5 cents; on fluxing lime 10.5 cents; and on lime 18 cents. The lime produced at complainant's plant is used for all the purposes for which different rates are published from Buckeystown. The product manufactured at the eastern points does not differ from that of complainant, except that certain agricultural or land lime may contain foreign matter not present in complainant's product. The presence of foreign matter in lime used for agricultural purposes may obtain at some of the plants located at the eastern points where kilns of older type, known as pot kilns, are in use. At complainant's modern plant all of this matter is eliminated by means of a hydrator which throws off the foreign substances. Defendants' witness stated he knew of no reason for different rates on the various kinds of lime.

The record is clear that, with the possible exception of lime containing residue or foreign matter, there is no difference in the transportation characteristics of the lime produced by complainant and its competitors at the eastern points, and there is no justification for varying rates which are based solely on the use to which the lime is put. Our findings herein will therefore apply on lime of all kinds, but they are not to be construed as disapproving the establishment or maintenance of lower rates on lime containing a substantial portion of residue or foreign matter than on pure lime.

We find that the rates on lime, in carloads, from Mitchell to distinations in central territory in the states of Pennsylvania, West Virginia, Ohio, and Michigan are and for the future will be unreasonable to the extent that they exceed or may exceed those which would result under the following scale, applied in the same manner and under the same formula for computing distances as that prescribed for cement rates from Mitchell in Atlas Portland Cement Co. vs. C., B. & Q. R. R. Co., supra, as modified by the supplemental order of August 22, 1923, in that proceeding.

Distance scale	Rates Cents
120 miles and over 100	12
140 miles and over 120	12.5
160 miles and over 140	13
180 miles and over 160	13.5
200 miles and over 180	14
220 miles and over 200	14.5
240 miles and over 220	15.5
260 miles and over 240	16
280 miles and over 260	16.5
310 miles and over 280	17
340 miles and over 310	17.5
370 miles and over 340	18
400 miles and over 370	18.5
430 miles and over 400	19
460 miles and over 430	20
490 miles and over 460	20.5
520 miles and over 490	21
550 miles and over 520	21.5
580 miles and over 550	22
610 miles and over 580	22.5
640 miles and over 610	23
670 miles and over 640	23.5
700 miles and over 670	24

We further find that rates on lime, in carloads, from Mitchell are, and for the future will be, unduly prejudicial to complainant, and unduly preferential of its competitors at Buckeystown, Frederick, Grove, and Lime Kiln, Md., Bakerton and Eagle, W. Va., Stephens City and Strasburg, Va., and York, Pa., to the extent that the rates from Mitchell and the rates from the competitive points above mentioned to points in central territory located in the states of Pennsylvania, West Virginia, Ohio, and Michigan fail to bear a relationship expressed as follows:

"From Mitchell, on the basis prescribed as reasonable.

"From Buckeystown, Frederick, Grove and Lime Kiln, Md., Bakerton, and Eagle, W. Va., Stephens

City and Strasburg, Va., and York, Pa., on the following basis: 19 cents per 100 lb. to points in 60 and 67% territories; 24 cents per 100 lb. to points in 85% territory, 28 cents per 100 lb. to points in 100% territory, and rates to points in other percentage territories in the states involved made the established percentages of the 28-cent or 100% rate."

The rates prescribed reflect and include the general reductions of July, 1922.

In the Atlas Portland Cement case, referred to, in which the same method for computing distances was prescribed as in this case, we granted fourth-section relief to carriers having circuitous routes pending the effective date of the order to be entered pursuant to the further proceedings in Western Cement Rates, supra, with respect to such relief. In this case similar relief will be granted and defendants herein having circuitous routes between Mitchell and common points will be authorized to establish, and to continue for a period of 90 days from the effective date of the period than 90 days shall have been filed within order herein, rates on lime, in carloads, from Mitchell to said common points the same as maintained via the short lines or routes from and to the same points, and to maintain higher rates at intermediate points, but not in excess of the scale of rates prescribed herein, provided (1) that this relief shall not include intermediate points as to which the haul of the circuitous line or route is not longer than that of the direct line or route between competitive points; (2) that the rates at the said intermediate points shall in no case exceed the lowest combination, and (3) that in instances where specific applications for permission to continue any of the said rates for a longer period than 90 days shall have them filed within the period of 60 days from the effective date of the order herein, such rates may be continued until the said applications shall have been determined.

Fourth Section Order No. 8844, issued in connection with the report and order in this case gives the relief indicated in the findings.—*Traffic World.*

Rates on Lime

ESTABLISHMENT of rates on lime from Dolomite, Utah, to points on the Oregon Short Line in Idaho, Montana, and Oregon, in accordance with a scale of distance rates, not later than April 26, has been ordered in No. 13305, Utah Lime and Stone Co. vs. Atchison, Topeka & Santa Fe et al. Existing rates were condemned as unreasonable. The scale and the effective date of the revised rates are the same as prescribed for plaster in the Nephi Plaster and Manufacturing Co. case, decided the day before the lime case. The commission also prescribed rates on the Union Pacific in Wyoming and on the Denver & Rio Grande Western in Colorado in specific amounts. All are to have a minimum of 60,000.

The commission's decision, opinion No. 9144, 87 I. C. C. 170-80, on account of references to the earlier case of Nephi Plaster and Manufacturing Co. vs. Denver & Rio Grande Western et al., 87 I. C. C. 159, and the fact that the same scale for making rates on lime was prescribed in the instant case, may be regarded as a supplement to the earlier one. The scale and the minimum are the same and the rates to Portland and other Pacific coast points are to be held as maximum at intermediate points.

An additional feature, however, is the prescription of specific rates to points in Colorado and Wyoming west of Colorado common points, based on a finding of unreasonableness. The specific rates, in connection with a minimum of 60,000 lb., are as follows:

To—	Cents
Rock Springs, Wyo.	23
Rawlings, Wyo.	28.5
Lima, Colo.	28
Grand Junction, Colo.	29
DeBeque, Colo.	30
New Castle, Colo.	32.5
Glenwood Springs, Colo.	32.5
Leadville, Colo.	35

More Lime Rates

FURTHER revision of rates on lime from Dolomite, Utah, has been ordered not later than April 26, the date when other revisions on lime and plaster are to take effect, in a report on No. 13304, Utah Lime & Stone Co. vs, Atchison, Topeka & Santa Fe et al., opinion No. 9145. In this case the commission dealt with rates to Los Angeles and other points on the lines of the Santa Fe and Southern Pacific. It said:

"We find that the rates in issue for the movement of lime, in carloads, from Dolomite, Utah, are not unduly prejudicial and that the rate to Los Angeles, Calif., is not unreasonable, but that the rates to the other destination points are, and for the future will be, unreasonable to the extent that they exceed, or may exceed 40 cents per 100 lbs., minimum 50,000 lbs., to all points in California south of Stockton on the lines of the Southern Pacific and the Santa Fe to and including Bakersfield, and 45 cents per 100 lbs., minimum 50,000 lbs., to Mojave and points on the coast division of the Southern Pacific, south of San Francisco, such as Salinas, Santa Barbara, Ventura and the principal intermediate points. These rates take into consideration the reductions authorized in Reduced Rates, 1922, I. C. C. 676.

Kansas Cement Rate Case

THE Topeka, Kans., *Journal* has the following to say of the cement rate case now under consideration:

Four states are now involved in a cement freight rate case now pending before the Kansas State Public Utilities Commission and the United States Interstate Commerce Commission, although originally it pertained only to an 11-mile haul from Sugar Creek, Mo., to Kansas City, Mo., according to Clyde M. Reed, chairman of the state commission.

"Starting a freight rate case is like throwing a rock into a pond," remarked Mr. Reed. "The effect grows and grows until the entire surface of the pond is disturbed by the ripples."

The Iola Cement Traffic Association, which includes nearly all the cement plants in southeastern Kansas, has protested that the rate of the haul from Sugar Creek, Bonner Springs and other plants in the Kansas City district is lower, proportionately, than is available to the southeastern Kansas or gas-belt cement firms. Because of the interstate nature of the controversy it is being considered jointly by the state commision and the interstate commerce commission—the first case to be heard in Kansas before a joint commission.

Chairman Reed announced today that the hearing probably will be resumed here about February 15. Meanwhile the State Utilities Commission has received letters from state commissions and cement organizations in Missouri, Nebraska and Colorado that they, too, desire to take part.

Some years ago the Interstate Commerce Commission authorized an increase in freight rates, 3 cents a hundred pounds to 7 cents for the Bonner Springs-Sugar Creek to Kansas City haul. At the same time the southeast Kansas haul was increased from 7 to 11 cents. This was in keeping with a differential of 4 cents between the two hauls, which had previously prevailed. But inasmuch as Missouri did not apply this rate, the plants near Kansas City continued paying the old rate, while the southeast Kansas plants were compelled to increase their rate to 11 cents. The southeastern Kansas companies petitioned the state and federal joint commission to restore the 4-cent differential.

Indiana Gravel Rates

KICKAPOO Sand and Gravel Co., operating at Peru, Ind., has filed a petition with the public service commission asking a hearing on its plea for a reduction of the freight rate charged on its products by the Chesapeake and Ohio, the Wabash and the New York, Chicago and St. Louis railways to points in the state.

The petition sets forth that for two years the company has been shipping sand and gravel to intra-state points on the C. & O. from Richmond to Chicago; on the Wabash from Ft. Wayne to Lafayette, and on the N. Y. C. & St. L. from Rochester to Noblesville and paying a rate that runs from 70 cents a ton from Peru to Fulton, a distance of 20 miles, to three dollars a ton from Peru to Muncie, 97 miles.

This scale of rates, it is declared, is discriminating and prejudicial against the company, inasmuch as there are from 25 to 20 competing sand and gravel companies in localities reached by the three railroads that are favored with a lower average schedule of hauling costs.

California Cement Rate Cases Settled

FINAL settlement of what have been known as the cement cases, actions before the railroad commission involving the charges for transporting cement by rail, has been made in an order directing the Southern Pacific and other carriers to put into effect lower rates for cement hauling in carload lots from Davenport and San Juan to Sacramento and other points in the northern and central part of the state. The effect of the decision will be to restore to the Sacramento territory the pre-war difference in rates and to place the producing mills at Davenport and San Juan on a competitive basis in a consuming market with Cowell, Cement and Napa Junction, the other producing points. The present difference at Sacramento is $1.40 per ton. Under the new schedule of rates the differential will be $1.20.

Shooting Clinker Rings from Cement Kilns

By Geo. H. Garrison
Remington Arms Co., Inc., Bridgeport, Tenn.

OUR investigation of the subject of shooting out clinker rings in cement kilns which has been carried on for the last several months, seems to have reached a satisfactory conclusion so far as we can determine from considerable experimenting with various projectiles and arms and actually removing these obstructions which form in or near the outlet of the revolving cement kiln.

We find that the common practice is to attempt to remove a portion of these rings with long, hollow bars through which a stream of water is passed to keep the bar cool. This is accomplished with varying success. When the rings form a considerable distance from the outlet, it is usually necessary to shut down, allow them to cool, and then chip out the hardened clinkers with bars and heavy chisels. This, of course, entails the loss of a great deal of time and affects the production accordingly. Many have tried to shoot these rings out with a high power rifle, machine gun and shotguns, using a 1-oz. ball with more or less success, especially with the 12-gage shotgun and the single lead ball weighing approximately 1 oz. All of these methods, however, have quite serious drawbacks. The 12-gage shotgun, an arm manufactured for sporting purposes, does not seem to entirely fill the bill under the abnormal conditions met with. It is very exhausting and unpleasant to the men doing the shooting and takes a longer period of time than is considered necessary. In the case of the high power rifles or machine guns, using the government service cartridge, fairly good results could be obtained but inasmuch as we attempted to investigate this subject thoroughly, we were soon convinced that much damage to the cement-making equipment would be likely to result. Many of these shots are liable to reach the back end of the kiln and the chimney for the reason that up to the distance of 175 ft., the fall of the bullet is very small indeed and should a few shots be aimed below the clinkers, there would be nothing intervening to prevent their digging their way into the chimney foundation. As such bullets easily penetrate ½-in. boiler plate at 50 ft., we decided that work along that line should be avoided, if possible.

Close-up view of gun for removing clinker rings from cement kilns

Tripod mounting for gun for shooting clinker rings from cement kilns

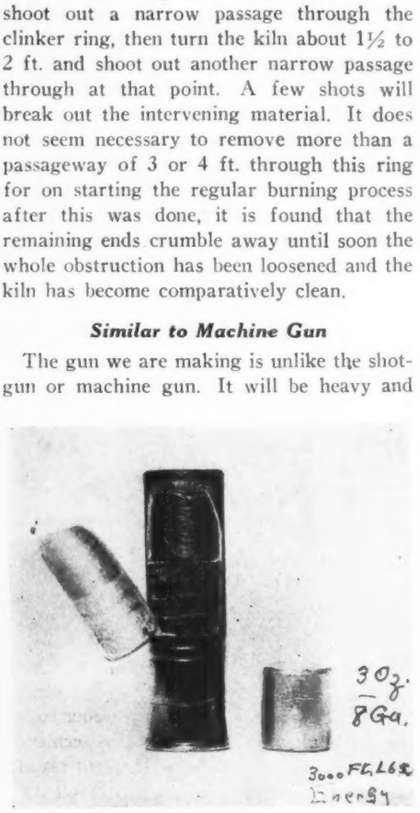
We have developed a blunt end projectile, weighing nearly a quarter of a pound, measuring about 1 in. in diameter, but having a low velocity. However, this low velocity does not lessen its value, for the reason of its weight. It strikes a blow of about 3000 ft. lb. which is about one-quarter again as powerful as a service cartridge produces. The principal advantage of this projectile is its trajectory which is quite a pronounced curve. It would be practically impossible to shoot it through the kiln from end to end as it would take up in the cement or cement material before reaching that distance.

We have designed and have under construction a special type of gun adapted particularly for use in cement plants which will be used with the above described cartridge. Its main features will be ruggedness and extreme simplicity. It is equipped to take up in itself all the recoil, being mounted on a tripod affair similar to that of a machine gun and is anchored by a hook to the lip of the peep hole of the kiln. This gun will

enable any operator to break up a clinker ring when still in its formative stage, no matter what its position is in the kiln with a minimum number of shots. The best method for doing this it seems to us is to shoot out a narrow passage through the clinker ring, then turn the kiln about 1½ to 2 ft. and shoot out another narrow passage through at that point. A few shots will break out the intervening material. It does not seem necessary to remove more than a passageway of 3 or 4 ft. through this ring for on starting the regular burning process after this was done, it is found that the remaining ends crumble away until soon the whole obstruction has been loosened and the kiln has become comparatively clean.

Similar to Machine Gun

The gun we are making is unlike the shotgun or machine gun. It will be heavy and



One of the cartridges used in the gun weighing nearly a quarter of a pound

free from complicated mechanism of any sort. The most unskilled laborer may operate it successfully on first trial. It is built to stand up under the hardest sort of use including the condition of dust and grit which it is called upon to withstand. The management of the cement plant in which our experimenting has been carried on and to whom we are under considerable obligation, suggested that if they were equipped with a gun of this sort together with the ammunition which in their opinion we had correctly designed, a few shots at the proper moments when these rings started to form would prevent it ever becoming necessary to remove a serious condition as is usually the case at present. Inasmuch as the projectile has already been successfully tried out, the introduction of this combination to the industry will be given serious consideration in the future. There seem to be approximately from 60 to 70 plants in the United States having this trouble. There seems to be a distinct problem in connection with the cement material forming mud rings where introduced into the kiln at the upper or intake end. This is an entirely different condition from the clinker rings in the lower or discharging end of the kiln. We are making a separate investigation of this subject.

Making Portland Cement in China

IT is sometimes good for American business men (in times of congressional oil investigations, etc.) to see how business is done in other places. Our good friend, M. H. Chou, of Shanghai, China, sends a newspaper clipping of the trials and tribulations of a well-known Chinese cement company.

Local shareholders of the Chee Hsin Cement Co., Ltd., are in arms against the civil governor of Chihli, Wang Cheng-ping, for the latter's demand for certain levies to be paid to his province.

In a telegram recently addressed to the Cabinet, the Ministry of Agriculture and Commerce and the Chihli Industrial Bureau, the shareholders styled the assessment unlawful, unsupported by facts and unreasonable.

The Chee Hsin was the first cement company to be established in China, its inception taking place just about 20 years ago when it was started by certain foreign capitalists. After a short period of operation, the company was bought over by Chinese and was given by the then Viceroy of Chihli special privileges for which a levy of one-fourteenth of the net profits was made for the purpose of encouraging industrial enterprises in the province.

Following the enactment of the commercial code under the Republic, these privileges were withdrawn and the company was given permission by the Ministry of Agriculture and Commerce to stop paying further tributes to the Chihli authorities.

Pressed by the need of funds at Paoting, however, the Chihli executive recently repudiated the authorities of the Ministry in giving the permission and repeatedly demanded the payment of the old levy. Consequently, the shareholders have organized a union at Shanghai for the purpose of fighting the case.

Protest to Governor

A translation of the memorandum sent to Governor Wang of Chihli follows:

"Under both the commercial codes of the Ching Dynasty and the Republic, a commercial company is required to pay nothing besides the lawful taxes. There is no special levy. The levy made on the Chee Hsin came into existence when the Viceroy of Chihli of the Manchu Regime was functioning. He granted special privileges to the company, which had a monoply of carrying in Chihli and had preferential rights in Shantung and Manchuria. Even in the Yangtsze Provinces special rights were given in Wuhu, Anhui; and Lungtai and Kaochi of Kiangsu.

"Because of that the levy was assessed.

"Today, the office of the Viceroy of Chihli has been abolished. His substitute, the Governor of Chihli, is unable to enforce the privileges granted to the company. Permission has been given to other concerns to operate in Chingching and Shihchiachwang of Chihli, Chefoo of Shantung and Shanghai, Wusih and Nanking of Kiangsu. The effect of the special protection given by the viceroy having been lost completely, it is useless to talk about levies.

* * * * *

"Following mature consideration, we consider that the governor of Chihli is no longer capable of functioning like the viceroy of Chihli and that any attempt to enforce a levy is unlawful. Secondly, in trying to enforce the assessment, he has ignored the important fact that this company is not enjoying the special privileges for which the assessment was originally made and lastly it is highly unreasonable to discriminate against an old company which did so much for the encouragement of industry in China.

"For these three reasons, we, as shareholders, vigorously repudiate any liability that may be placed upon us through this demand which violates the commercial code as well as the existing regulations for the administrative system."

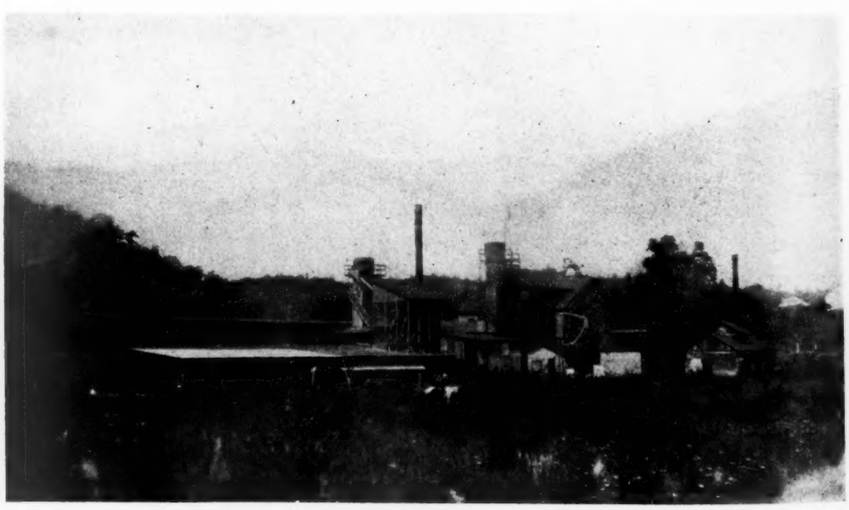
Paint as a Rock Product

PIGMENT PRODUCTS CO., of Henry, Va., is a new concern for making pigments from the rocks and clays found near Henry. The plant has been in operation only two months but is already producing 40 tons per day of pigments.

The equipment of the plant includes Sturtevant rotary fine crushers, Fuller-Lehigh rotary dryers and Raymond air separation pulverizers. In building the plant provision has been made for adding machinery to increase capacity.

W. H. Prilliam has charge of the operations. He has had a long experience in the pulverizing and mixing of pigments and their reduction from the crude minerals.

While the ochres and blacks are mainly produced from material found in the vicinity of the plant, some raw ores are being shipped in from Georgia and New York state and ground here to pigment consistency.



Plant of the Pigment Products Co., Henry, Va.

Selling Through Dealers

Knickerbocker Portland Cement Company Outlines Its Sales Policy, Which Is of Equal Interest to Lime and Argicultural Limestone Producers

AN attractive little booklet entitled "An Explanation of Our Sales Policy" has just been received from the Knickerbocker Portland Cement Co., New York City, which contains a succint statement of the dealer distribution problem—a problem of almost equal importance to all rock products producers, but one which has received more study from cement manufacturers than all the others put together. Herewith are extracts from the booklet:

"This company has a mill price for its product which we endeavor to get as far as the various factors of competition will permit. This mill price, plus the bags in which the cement is packed and the freight to the point of delivery, is the delivered price to the dealer. The price to the United States government and to those railroads which serve our mill is the mill price plus bags; they make their own freight arrangements. The price to the consumer is the dealer's price plus a differential of from 10 to 15 cents per barrel, varying in different localities and under different circumstances of competition. This differential averages about 10 cents per barrel.

"Our policy is to sell our product through dealers in similar commodities, and we believe this policy is fundamentally sound. We believe that the retail dealer in general building materials, of which cement is but a small part, is an important individual in his community; that his is an established business enterprise depending upon the prosperity of the community more, perhaps, than does any other class of retail dealer; that his business is more closely identified with the progress of his town than most others, and that in order to derive an adequate income from his business he must not only be well established in his community, serve his customers satisfactorily and have for sale the commodities that are wanted, but must also wait upon the upbuilding of the town for his advancement.

"We believe that the retail dealer of cement is just as essential as is the retail dealer in food, clothing, drugs or any other of the many enterprises that are considered in every community. We believe he performs a real and useful service to his community, a service for which every other branch of retailing receives a profit, and for which the cement dealer deserves a profit.

"The above outlines our attitude with regard to the standing of the retail dealer, and the service he renders his community. The dealer is of value to our company in every one of the ways mentiond above, because he makes it possible for us to get our product to the ultimate user quickly, economically and conveniently. But in addition to this, there are even more important reasons why we follow the policy we do. These reasons are as follows:

16. Having an investment and being a permanent establishment in his community he is active 12 months in the year in promoting the use of cement, whereas the casual user may require a quantity for some specific purpose, and never need any more in the same locality.

17. The dealer will probably buy and sell many times the quantity of cement consumed by any individual user during any one year, and will continue to do so for succeeding years; the dealers' business is a continuous performance.

18. Being on the ground the dealer is much better qualified to pass on the credit of local users and secure payments as the work progresses, frequently helping contractors and others complete work by extending credit or arranging for it thru local banks. Many dealers finance various local users as far as the purchase of building materials, including cement, is concerned. Because of greater credit protection through direct contact and delivery, he can grant better terms on all material than could any individual cement company on cement alone.

19. It is far more expensive, in fact, almost prohibitive, for this company to undertake to sell its product to the thousands of users of cement who operate in the territory where our product is used. The cost of this sales work would add to the cost of cement. The dealer is not only a distributing factor, he is a selling factor as well.

20. The credit risk is far less in selling to dealers than in selling to consumers. Our statistics show that due to the hazards of construction work, 98 per cent of our losses have been from consumers.

21. Without the dealer as a central point of distribution, cement, because of its great weight per unit and high freight rate in less than carload lots (approximately two and one-half times greater than carload lots) would greatly increase in cost, especially in smaller towns. Its use would be curtailed through competition with other materials, or increased construction cost in that community would result. We know of some towns where a minimum car of 132 barrels shipped to the dealer has been sufficient to meet the demand for a year.

"We have tried to set forth as succintly as possible our viewpoint, and if the foregoing in any way assists in clarifying the misconceptions surrounding this phase of marketing our product, we shall be pleased.

"In conclusion, we would like to say that like the 'f.o.b. point of delivery' and other customs, the policy we follow is not an arbitrary one, but rather a system developed after years of experience in trying to safeguard the interests of the people who are of value to us, and our own best interests."

Cement Dust Collection

THE Trinity Portland Cement Co., Dallas, Tex., has a dust-collecting system that is 93% efficient, according to newspaper quotations from a talk before the Technical Club of Dallas by Charles Hurst, mechanical engineer of the company.

Dollings' Officials "Guilty" in Ohio Phoenix Portland Cement Co. Case

AFTER two hours' deliberation a federal jury returned a verdict of guilty in the cases of William G. Benham and Dwight Harrison, former president and vice-president of the R. L. Dollings Co. of Ohio, respectively charged with having used the mails to defraud in connection with the promotion of stock sales of the company.

The indictments on which Harrison and Benham were convicted contained 11 counts, each of which carries a maximum sentence in the federal penitentiary of five years.

Immediately after the verdict was returned defense attorneys filed a motion for a new trial, and Judge John E. Sater, who presided during the trial, announced he would hear it the following Monday afternoon.

Both Benham and Harrison face another indictment charging conspiracy to defraud, which carries a sentence of two years in prison for each if tried and convicted. In addition to the federal indictments, Benham and Harrison are also facing charges in Franklin, Preble and Delaware counties in connection with their activities of the Dollings Co. and its 33 subsidiaries.

Harrison was convicted in Franklin County Common Pleas court December 19 on an indictment charging he made false representations in regard to the Ohio Phoenix Portland Cement Co., and was sentenced to pass three years in the Ohio penitentiary and fined $5000.

Hudson Valley Portland Cement Company Bankrupt

AN involuntary petition in bankruptcy has been filed in Federal District court against the Hudson Valley Portland Cement Corp. of 152 West 42nd street, New York City.

No estimate of assets or liabilities is given in the petition.

The petitioning creditors and their claims are the Allis-Chalmers Manufacturing Co., $171,949; Haskins & Sells, $1637, and the Stephens-Adamson Manufacturing Co., $231.

In an equity action, brought by the J. P. Burton Coal Co. against the Hudson Valley Portland Cement Corp. on December 10 last, Federal Judge John C. Knox appointed Martin Conboy receiver under a bond of $25,000. The cement corporation went into involuntary bankruptcy March 27. At the time of the equity suit the corporation owned a cement plant and property in the town of Alsen, N. Y., of 500 acres and was appraised in excess of $2,000,000. The authorized capital stock of 125,000 shares of no par value was given and there are outstanding approximately $1,243,000 of 8% gold bonds secured by mortgage on plant and property. Other liabilities amount to $750,000, partly secured and the assets in excess of liabilities amounting to $500,000.—*Financial America.*

Activities of the Canadian Rock Products Industry

New British Columbia Cement Plant Projected—Notable New Lime Hydrate Plant—Company Elections

AT the annual meeting of the Canada Cement Co., Ltd., at Montreal on February 25, the following directors were elected: G. W. Allan, Hon. C. C. Ballantyne, D. N. Butchart, Hon. J. P. B. Casgrain, H. L. Doble, Gordon C. Edwards, H. J. Fuller, Frank P. Jones, R. W. Kelley, Angus McLean, Hon. J. L. Perron, Farquhar Robertson, T. A. Russell, A. C. Taggo, Dr. R. E. Webster and E. M. Young. In the absence of President F. P. Jones, who is ill, the meeting was presided over by A. C. Taggo.

A report states that work will commence in the spring on the big cement plant for the Mainland Portland Cement Co. at Popkum, near Chilliwack, B. C. Chicago capital is behind the undertaking and the report quotes W. J. Budd, managing director of the company, as follows: "All the preliminary work has been completed and the work of erection will be rushed to completion after March 1."

The Dominion Lime Co., Sherbrooke, Que., have just completed at Lime Ridge, P. Q., a plant for the manufacture of hydrated lime. This product is used instead of lump lime for building purposes, for mixing with cement as a waterproof, as a disinfectant and for chemical, agricultural and other purposes. The building is made of steel and concrete throughout. The company's quarries yield a high quality of limestone, particularly adaptable to the manufacture of hydrate.

Hillside Sand and Gravel Ltd., 1983 Main street, Vancouver, B. C., has been incorporated with a capital of $50,000 to deal in sand and building supplies.

Granite Sand and Gravel Co., Ltd., Toronto, has been incorporated with a capital of $100,000 to quarry and deal in sand, etc.

Frank Jones, president of the Canada Cement Co., is a member of a syndicate proposing to erect a pulp and paper plant at Prince Geoge, B. C., to cost $10,000,000.

Seneca Gypsum Co., Ltd., Hamilton, Ont., has been incorporated with a capital of $500,000 to manage mines and to treat and manufacture minerals. Incorporators include L. S. Minchin, W. T. Walsh and John Eley, manufacturer, all of Hamilton, Ont.

The name of Crushed Stone Ltd. has been changed to Toronto Stone Co., Ltd., Toronto.

Wallace R. Harriss, president of the Concrete Products Association of the United States, addressed the Concrete Products Association of Canada at a luncheon at the Royal Connaught Hotel, Hamilton, Ont., on March 19.

The following rock products were produced in Nova Scotia last year:

	1923	1922
Silica brick (number)	1,253,119	.....
Limestone and dolomite (tons)	118,193	153,564
Limestone for fertilizer (tons)	1,003	3,659
Crude gypsum (tons)	313,678	256,876
Calcined gypsum (tons)	16,794	.....
Building and ornamental stone (tons)	2,762	6,028
Fertilizer from basic slag (tons)	11,527	8,877

The silica brick were manufactured by the Dominion Iron and Steel Co., Ltd.

The International Gypsum Corp., Ltd., Eastern Harbor, was organized in 1923 with J. W. McFarland manager. The company is capitalized at $1,000,000.

The mill building is 210x400 ft. A warehouse, 165x75 ft., is capable of holding 5000 tons of finished plaster. Another warehouse of 3000 tons will be built at the pier and a rock bin of 2500 tons will be erected over the railway to facilitate shipping. The quarry is worked by steam power and the mill by electricity.

The Iona Gypsum Products, Ltd., Iona, was established in 1922 with I. W. Buckley as manager. The other companies are old established concerns.

The following rock products were produced in the province of Quebec in 1923:

	1923		1922
	Quality	Value	Value
Feldspar (tons)	12,026	$ 97,591	$ 115,483
Cement (bbl.)	3,173,993	6,347,986	5,906,998
Granite	.....	507,698	547,968
Lime (tons)	72,289	574,741	666,968
Limestone (tons)	1,138,923	1,861,697	1,698,833
Marble (tons)	2,170	197,555	253,746
Sand, building (tons)	521,087	155,648	327,277
Sandstone (tons)	12,720	25,246	32,008
Slate (tons)	1,836	17,289	14,863

In order to insure the soundness and permanency of Canada's highways, the Department of Mines at Ottawa is giving particular attention to the various materials entering into the construction of new roads and the surfacing of others. Under the direction of Howells Frechette, chief of the road materials division, H. Ganthier is making a special investigation into the endurance of the recently built highways in Ontario and Quebec and R. H. Pitcher is carrying on a survey of the road materials in Nova Scotia and New Brunswick. The laboratories of the Mines branch are equipped for complete physical tests of rocks, sand, and gravel used in road building. Tests at the laboratory are made for two purposes (1) to determine the characteristic qualities of the materials and (2) to ascertain whether they conform to determined standards established by tests. There are five standard tests made on road building rock. The most important are resistance to abrasion and for resistance to impact. The others are for hardness, specific gravity, and absorption. Gravels are examined to determine their adaptability for the construction of gravel and concrete roads and to obtain some knowledge of their ability to resist wear and to bind. Limestone is widely used as a road material in Canada but the durability varies with composition and texture. The finer, more evenly grained varieties, as a rule, are more durable. A tough, hard limestone will give good results in some cases but most limestone is soft and wears rapidly. The experts are making an intensive study of all these materials.

Canada Cement Company Stock as an Investment

A TORONTO newspaper gives the following information:

In view of the demand for Cement common at enhanced prices, followers of the market are inclining to the opinion that the position of this company has strengthened to such a point that there is a speculative future for it. A letter was issued recently by a Montreal firm dealing with Canada Cement stocks. It is shown that the price of the common has advanced from its low point of 52 in the autumn of 1921 to its present high point on a gradual upswing. The analysis was made when the common stock was around 88, yielding 6.81%, and the preferred at 106, yielding 6.60%.

"These yields, it is true, are not high, but the speculator or investor has two things to consider—safety, and the prospects for further enhancement in the value of his securities—and on both of the counts we believe the Cement issues have exceptional merit," say O'Brien & Williams.

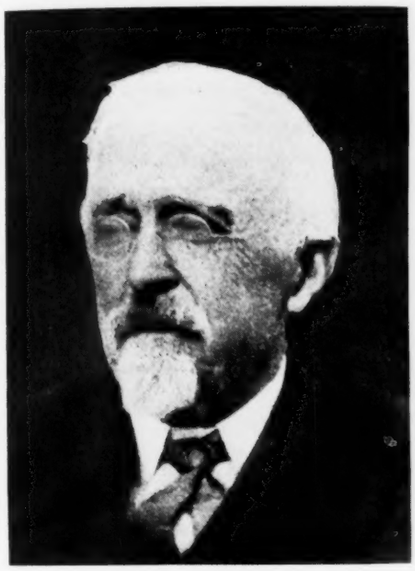
"In 1929 all of the company's bonds will be retired, and with no bonds ahead of them we believe that the preferred stock will be selling on a bond basis, while the common, in anticipation of a substantially higher dividend, will be selling over par. Speculators have in the past paid very little attention to Cement, and the investors have had it pretty much to themselves, but we believe that the powerful liquid position of the company will some day strongly appeal to the speculative imagination, and that Cement stock will acquire an unusual reputation such as Montreal Power enjoys at the present time.

"Few people perhaps realize that the company's properties stand in the books at a lower price than when Frank P. Jones took charge of the company in 1909, and this in spite of the fact that the capacity of the plant has been doubled, and the company now owns the largest individual plant in the British Empire."

A Pioneer Builder in the Gypsum Industry

J. B. EHRSAM, founder and head of the J. B. Ehrsam & Sons Manufacturing Co., died at his home in Enterprise, Kan., on March 8, at the age of 83. He was one of the pioneer millwrights and flour mill builders west of the Mississippi river, and a pioneer builder of gypsum mill machinery.

Mr. Ehrsam was born near the city of Berne, Switzerland. The days of his boyhood were spent in his native land, where he learned the trade of machinist and millwright, under a five-year apprenticeship.



J. B. Ehrsam

He came to the United States in 1867 and after spending one year in Pennsylvania, he settled in Geary county, Kan., and devoted some time to farming and ranching. Later on, he secured work as millwright and in 1868 erected a flour mill for Christian Hoffman at Louden's Mills, now Enterprise. In 1872, he started a millwright plant and machine shop at Enterprise and later on commenced the manufacture of flour mill machinery and supplied the equipment for many of the earlier mills throughout the state of Kansas. His business gradually developed into the manufacture of elevating, conveying and transmission equipment and gypsum machinery, as well as special equipment for flour mills and grain elevators. He was the active head of his company until about two years ago, at which time he turned over the active management of the business to his sons and associates.

William G. Henshaw

WILLIAM G. HENSHAW, president of the Riverside Portland Cement Co., Riverside, Calif., died at his home in San Francisco March 2. He was a pioneer in the industry on the coast and well known by the leaders in the industry everywhere.

Changes in Ohio Macadam Road Specifications Help Stone Producers

THE Ohio Department of Highways has completed a revision of specifications for road work and the new specifications are now in the hands of the printer.

Perhaps the most important change in the specifications relates to the construction of macadam. This change originated with the engineers of the department and the design is to obtain a more adequate check on the contractor and avoid the possibility of his skimping the work.

Contractor Not Allowed to Skimp on Stone

The plans or approximate estimate, under the new arrangement, will show not only a minimum thickness but also a minimum tonnage. The finished thickness of the courses, indicated on the plans or in the approximate estimate, will be the minimum thickness required and this thickness must be increased where necessary to conform to the specified tonnage.

Before final estimate is allowed the contractor will be required to file with the highway department receipted freight bills, where railroad shipments are made, and certified way-bills, when material is received in any other manner, showing that at least the tonnage specified has been used in constructing the pavement. Copies of freight bills and way-bills are also required to be furnished the inspector as requested during the progress of the work.

It is the intention of the department, after the new specifications are in force, to use this method on all work except where the contractor himself obtains the stone from a local quarry. In cases of that character no tonnage of material will be shown on the plans or in the approximate estimate and no freight bills or way-bills required.

Contractors Won Over

The first impulse of macadam road contractors was to oppose this change. The secretary of the association was favored by personal conferences or extended discussions by mail with approximately 40 contractors who build macadam roads and after discussing and considering the proposed change only two contractors are now on record as not favoring the same.

We have not had an opportunity for a personal conference with either of these gentlemen and doubt whether they will maintain their present position when they thoroughly understand the nature of the change and the purpose which the department has in mind. If there is any truth in the common report that a few contractors on macadam roads have been skimping on their quantities of stone and that this accounts for their appearing to submit unusually low bids the proposed change will uncover and correct this situation. In other words, the change will place the occasional contractor who does not plan to deliver full quantity on an equal plane with the large number of contractors who bid their work expecting to build it in strict accordance with the speci-

A Veteran Cement Mill Superintendent

ROBERT BRUCE KOONS, general superintendent of the Wolverine Portland Cement Co., was born at Watsontown, Pa., April 4, 1870, and died at Coldwater, Mich., March 8, 1924.

Mr. Koons' first introduction to the cement industry was with the Sandusky Cement Co. plant at Baybridge, Ohio. Afterwards he was employed by Lathbury & Spackman, consulting engineers, in the capacity of expert burner and kiln operator; and in such work assisted them in putting into successful operation plants over which they were supervising engineers.

Later he went with the Cowham system of cement plants in practically the same capacity of getting them started to a successful operation.

R. B. Koons

In 1910 he accepted a position with the Michigan Portland Cement Co., of Chelsea, Mich., as superintendent, and continued with the above company until 1918.

In the spring of 1919 he was local superintendent of the Wolverine company's Quincy plant and the following year, 1920, was appointed general superintendent of the two plants of the Wolverine company, which are located at Coldwater and Quincy, Mich., in which capacity he served until his death.

Lime and Limestone Demonstration Trains

TOURING the country with lecturers and exhibits to prove to farmers the value and necessity of agricultural lime and limestone seems to have become an established practice with the principal railways in the East. The Baltimore & Ohio sent out an "agricultural lime special" out a year ago with the co-operation of the Eastern District of the National Lime Association under the direction of Henry M. Camp. This year the Erie, the Buffalo, Rochester & Pittsburgh and the New York Central are following suit.

The National Agricultural Limestone bulletin of March 31, notes:

Lime demonstration train of the Baltimore & Ohio R. R. Courtesy National Lime Association

Special lime demonstration car on the Baltimore & Ohio R. R.

"Mr. King reported that the Erie railroad, under supervision of its agricultural agent, H. H. Rogers, would run an agricultural train starting in April and continue until June. The territory to be covered—western New York, western Pennsylvania and eastern Ohio. Car will remain at every station one day. The train will have an agricultural exhibit from New York State College at Ithaca. This car will show results of using lime and limestone. The second car will be equipped with educational movie films and pictures. Third car will be a resaurant. Fourth car a sleeping car. The present plans of the Erie railroad is to run this 'agstone' train as far west as Mansfield, Ohio.

"Mr. King reported that he had been invited to assist in working up an interest in attendance at the Ohio station stops for this train.

"Under supervision of Earle G. Reed, Ohio agricultural agent for the New York Central Lines, and the State College of Agriculture, two special train coaches will leave Columbus, Monday, April 7, 1924, 5:15 p.m., for a 12-day agstone missionary tour in three Ohio counties.

"Mr. Reed has arranged for 18 station stops. He has the signed pledges of editors, county agents, farm bureau officers, grange officers, chambers of commerce, county fair boards, bankers and grain dealers to boost for and attend these agstone train meetings.

"Mr. Reed has done a lot of work weeks ahead to make this agstone train tour a success. He has personally visited many persons in each county and secured unusual pledges of team work and co-operation."

Still Another Ohio Hydrate Project!

INCORPORATION for $750,000 of the White Lime Hydrate Co. of Kansas Station, this county, is in progress. The company has obtained 180 acres of what is believed to be the best limestone land in northern Ohio. Plans for the plant provide for a daily output of 325 tons of hydrated lime and 750 tone of crushed rock. It is expected that the plant will be in operation by November.—*Toledo Blade.*

Agricultural Lime Introduced in Oregon Under State Auspices

SEVERAL years ago the Oregon legislature authorized the purchase of the lime deposits of southern Oregon and the development of these deposits to the end that the farmer might obtain lime at a reasonable price. Last year about 6000 tons were used on western Oregon farms but if it was thoroughly understood the great benefit to be derived in increased production, much more would be used.

The price at the plant is $4 per ton and the Southern Pacific has reduced the rate on lime from 10 to 30% in order to increase the use of lime.

The lime board also has a plan by which farmers can purchase on time or installment basis. Sam H. Moore, president of the state board, and A. B. Cordley, secretary of the lime board, are very desirous that anyone interested apply to them for complete information. The Oregon Agricultural College expects to have very complete information as to method of using, amount required, etc.—*Ranier, Ore., Review.*

A Correction

A NEWS item in the March 22 issue of ROCK PRODUCTS referred to the Linwood Cement Co., Davenport, Iowa, and mentioned Frank Neufeld and A. C. Klindt as heads of the company. This was a slip, for as most ROCK PRODUCTS readers (including the editors) ought to know the company is managed by our good friend J. F. Schroeder, general manager, and A. E. Horst is president. At present the company is producing only crushed stone, but plans for a portland cement plan are progressing.

Portland Cement Projects

New Plants Projected in Maine, Ohio, Tennessee, West Virginia, Oklahoma, Arkansas and California

THE new Hermitage cement plant at Nashville, Tenn., began production a few days ago without a hitch. The new plant of the Pittsburgh Plate Glass Co. near Zanesville, Ohio, will soon be making cement, as will also the state plant at Rapid City, N. D. Other new plants in various stages of completion are three in California, one at Detroit, one near Macon, Ga., one at Manitowoc, Wis., and two at Fort Worth, Tex.

Newspaper reports during the last two weeks state that:

"The Southland Portland Cement Co., 313 Independent Life building, Nashville, Tenn., is perfecting plans for the erection of a new plant on tract of property acquired some months ago in Crab Orchard, Tenn. The initial unit will consist of a number of buildings, with power house, estimated to cost close to $1,000,000, with machinery. It will have a capacity in excess of 850,000 bbl. per annum. James O. Parker is president.

Wabash Project in Ohio

"Completion of a deal for the erection of a new cement plant just east of Osborn, Ohio, by the Wabash Portland Cement Co. of Detroit, was announced recently by H. J. Jennings, secretary of the company.

"Official announcement of plans of the company reveals that approximately $1,750,000 will be spent in erecting the plant.

"The plant will consist of three rotary kilns, 10 ft. in diameter and 175 ft. in length. The mill, designed as one of the most modern in the Middle West, will be of concrete construction throughout. Work of construction is expected to begin at once.

"Its annual capacity will be 1,500,000 bbl. of finished cement.

"One thousand acres of land, lying on both sides of the Big Four and Erie tracks east of Osborn, were acquired by the Wabash company in the deal.

[The Southwestern Portland Cement Co. is also reported ready to build at Osborn.]

"A rich deposit of Clinton limestone, especially suitable for a high-grade cement making, attracted the company here, executives say. The firm has been working two years on buying the land which was acquired recently for approximately $250,000."

Atlas Buys More Property at Davenport

The Davenport *Times* of recent date records the "purchase of 83 acres of land in Pleasant Valley township, located opposite Campbell's Island, for $53,729, originally negotiated for by the Western States Portland Cement Co., now the property of the Atlas Cement Co., of New York City.

"The Western States Portland Cement Co. negotiated for the purchase of the land in 1921 when other land holdings in the vicinity were also purchased. About a year ago the plant was purchased by the Atlas company and much of the material and equipment, which had never been used, has been dismantled and moved."

The Little Rock, Ark., *Gazette* notes that "W. S. Allen, well-known engineer and railroad builder of Nashville, Ark., passed through recently en route home from St. Louis where he conferred with Chicago capitalists regarding the establishment of a cement plant at Nashville. He told friends the deal had been made and that such a plant would be erected."

New Oklahoma Plant Rumors

Several Oklahoma newspapers carry the following story:

"A $2,000,000 cement plant is to be erected shortly by the Boetcher interests, of Denver, Colo., east of Garnett. The site, 200 acres, has already been bought and the greater part of the land is in Rogers county. The plant is to be built along the Frisco railroad.

"The mill, according to the plans, which already are said to have been completed, will be complete and modern, the design having been accepted only after consulting with both American and foreign engineers.

"The complete equipment calls for two electric shovels, a gyratory rock crusher and hammer mill for stone, a second hammer mill for the preliminary crusher of the shale, 7x26-ft. compartment mill for raw grinding directly connected with a 500-hp. motor, kilns 10 ft. in diameter and 200 ft. long, equipped for coal, fuel oil or gas.

"Waste heat boilers will be installed to utilize the waste heat from the kilns, providing steam to operate two 3000-kw. steam turbines, furnishing the electric energy for the operation of the entire plant including electric shovels and other quarry equipment. The finish grinding will be done by 7x26-ft. compartment mills similar to those in the raw-grinding department.

"Clinker storage will be built with 100,000 bbl. capacity and 12 concrete storage tanks for finished cement will be constructed of 250,000-bbl. capacity, according to Nichols and Matthews. Six automatic packing machines will be installed, enabling the shipment of 10,000 bbl. per day.

"All buildings will be constructed of reinforced concrete and the arrangement and equipment planned with a view of economical operation.

"The present plans of the company is to start operation with two units, or kilns, but to ultimately enlarge it to the full capacity of three units as called for by the original plans.

"The company now owns in fee, approximately 200 acres on which are located the deposits of rock and shale which have been thoroughly tested by their geologists and chemists, with favorable reports on high quality of material necessary for the manufacture of their product. It has under option added acreage, sufficient to insure a supply for a long period. Negotiations for most of the acreage were first entered into last September and consummated in October.

"The company will open an office in Tulsa April 1 to direct sales of its products from other plants controlled by it and to direct the proposed construction work when it is started."

New California Project

Backed by Los Angeles business men, a new $3,000,000 corporation, to be known as the American Portland Cement Co., has just been organized at Los Angeles for the purpose of erecting a large plant at Imperial.

The first unit of the plant, to represent an investment of more than $700,000, will be started immediately, S. G. Ulmer, a director of the corporation, stated recently, according to the Los Angeles *Examiner*.

Following the completion of the first unit others will be erected until the completed mill will represent an investment of approximately $3,000,000.

The concern recently purchased several hundred acres of land at Imperial from which they will obtain their deposits.

Executive offices of the company will be maintained in Los Angeles and the bulk of the products manufactured will be sent here for distribution, Mr. Ulmer stated.

Directors of the American Portland Cement Co. are O. T. Deal, C. E. Merryweather, David Shepherd, S. G. Ulmer, E. P. Connolly, William Hopper, H. T. Lucas, W. L. Peck and H. B DeLong.

West Virginia is to have another cement mill—the Titan Cement Co. at Ackerman, Mineral county, is to erect a 1200-bbl. plant on the Potomac river between Keyser and Cumberland, according to the Wheeling *News*.

The company has recently purchased the property, which consists of 555 acres with a 10,000-ft. front on the river and which cost $337,000. A rock-crushing plant, already working in the quarries, was transferred with the property and will form part of the new plant to be erected at a cost of $275,000.

Several newspaper reports from Alabama mention a project for a state cement plant to be operated by convict labor.

At Rockland, Me., a very old project for a portland cement plant has been revived by the incorporation of the New England Portland Cement and Lime Corporation for $1,000,000. A. L. Miles, attorney, of Rockland is president and offices are to be established in Boston, Beacon Trust building, 37 Milk street, after April 15.

Santa Fe Railway Building Big Crushing Plant at Brownwood, Texas

HUNDREDS of men and teams are at work literally hewing and blasting the right-of-way for the railroad spur to be built by the Santa Fe R. R. along the side of famous Hall mountain, Brownwood, Tex., on top of which a great rock-crushing plant is to be operated by the company. Dynamite is being used freely and hundreds of tons of rock and dirt are being constantly thrown high in the air. The rock-crushing machinery will be placed as soon as the foundation has been blasted out and leveled down for the purpose.

The crusher will have a daily capacity of 1200 cu. yd. and the crushed rock will be used by the railroad for track ballasting purposes in all parts of Texas. The Sante Fe railway leased a large area of Hall mountain from the Hall brothers—Ira, Maury, Ed and Lee—for a period of 90 years, but the Hall brothers reserved a sufficient area to keep their own rock crusher running for many generations. The rock crusher installed by the Hall brothers on top of the mountain is running at full capacity and is turning out much material for street-building purposes in addition to furnishing large quantities for the Santa Fe people in the preliminary foundation work of its big enterprise. The payroll of the plant will be large, as a great number of hands will be given constant employment.—*Dallas News.*

Freight on Road Materials in Michigan to Be Investigated

THE State Administrative Board has asked the Michigan Public Utilities Commission to make a complete investigation of the freight rates in Michigan on highway construction materials, including sand, gravel, crushed stone and cement, to include not only intrastate but interstate rates of the Interstate Commerce Commission as well. The matter was brought to the board's attention by Charles J. DeLand, secretary of state, and was based on some facts which had come to the attention of board members in connection with the state's highway construction program. According to these facts, Mr. DeLand said Ohio now has an intrastate freight rate about 40 per cent under that of Michigan on road materials.

It appears that back in July, 1921, the Ohio state commission started an investigation of these rates and as a result of its findings the Interstate Commerce Commission made the reductions. Mr. DeLand says: "Indiana is also about to obtain material reductions in rates on its highway materials, according to information recently obtained here. If Ohio and other states are to receive the benefits of lower freight rates on their highway materials I see no reason why Michigan should not share in that reduction. We are using hundreds of thousands of tons of road materials every year and a reduction similar to that of Ohio would mean a big annual saving to the people in this state."

McDowell Gets Big Missouri Crushed Stone Contract

AT a recent session of the Missouri State Highway Commission, according to the St. Louis (Mo.) *Globe Democrat*, a tentative agreement for furnishing 675,000 tons of crushed rock for roads in the northwestern section of Missouri, centering around Smithville, in Clay county, and Gallatin, in Daviess county, was reached with R. N. McDowell of Kansas City, representing the McDowell Co. of that city, subject to conditions yet to be imposed on the McDowell Co. Nearly 750,000 tons of crushed rock is to be furnished at the quarries for $1.25 a ton, a total of $843,750.

White Sulphur Springs for Lime Men!

THE NATIONAL LIME ASSOCIATION will meet on May 20, 21, and 22 at the Greenbrier Hotel, White Sulphur Springs, W. Va. The program will include not only a report of the activities of the association, and addresses by men prominent in the lime industry, but there will also be scheduled certain special features, such as a Golf Tournament.

Will we go? You bet! We're boosters for golf and lime and lime and golf.—The Editors.

Fertilizer Business Still in the Dumps

FERTILIZER is being sold in the South below present cost of manufacture, according to W. D. Huntington, vice-president of the Davison Chemical Co.

"The '8-3-3' is being sold in the South now for from $18 to $21 a ton," said Mr. Huntington recently, "and the average cost of production is $22.50 per ton. The '8-3-3' consists of 8% phosphorate acid, 3% ammonia and 3% potash, which started the season at $24 a ton, but now has dropped below cost of production.

"Last year the season started with this fertilizer selling at $25 per ton cash and $30 on time, but this price was cut by the A. A. C. to $24 cash and $25 on time. The farmers, however, insisted on the same differentials as under the first price, which was the cause of bringing the prices down to the present low levels.

"As usual in such cases, the cut prices have not stimulated business, but on the contrary has caused the farmer to play a waiting game, as is usual in cases of a falling market, expecting the price to go still lower. The same thing happens on the stcok market. When a stock begins to drop people do not buy at once but hold off waiting for the stock to go still lower, and the farmer of the South is doing the same thing about fertilizer right now—waiting for the price to go lower.

"A standard brand of fertilizer cannot be manufactured at the prices at which it is being sold in the South at present," concluded Mr. Huntington.

This seems the general opinion prevailing among the fertilizer trade here, who without an exception place the blame for present conditions on the A. A. C. and hold out very little prospects for an improvement in the business in the near future.—*New York Journal of Commerce.*

Buy 130 Acres for New Quarry in Chicago District

THE A. C. O'Laughlin Co., Chicago, Ill., crushed stone producers, have bought 130 acres at 47th and Plainfield, in Lyons township, just outside of the town of Lyons, Cook county, from the Daniel B. Scully estate, for $115,000. It will be developed later for quarry purposes. Tolman, Sexton & Chandler were attorneys.

California Limestone Deposit Changes Hands

THE entire holdings of the American Gold Dredging Co. in Butte county, California, has been sold to the Pacific Gas and Electric Co., it is reported at Oroville. The transfer covers gold dredging properties and large limestone deposits that the American company has held for a number of years between Prentz and the junction of the West Branch and the North Fork of the Feather river. The limestone properties involved in the transfers include 10 workable leases. Reports of engineers state that the limestone in sight will supply 4000 bbl. of cement a day for a period of at least 15 years.

Not a Compliment!

BOASTING about the high rank of the municipality of Braddock the Pittsburgh, Penn., *Post* of recent date states: "Three construction companies doing an enormous business are also centered in the district, one of them, McCrady Brothers, the largest of its kind in the world. The McCrady Co. is the largest purchaser of sand, cement and *shale gravel* in the world."

The italics are ours. To the initiated this is paying McCrady Brothers about the same compliment we would pay the XYZ Breakfast Food Co. by stating they were the largest purchasers of *sawdust* in the world.

Eastern Producers and Dealers Very Optimistic

BUILDING continues to go forward at a pace hitherto unequaled. It is reported that building contracts for the first two months of this year exceeded those of the same period last year about 15%. According to the latest statistics of the F. W. Dodge Co. the total contracts awarded for January and February amounted to $601,880,600. It is by far the highest record ever attained for this period, and, although it represents only one-sixth of the year (and ordinarily the slackest building season), yet it is about one-sixth of the total volume of construction for the entire year 1923. With present indications of even greater activities during the spring and summer months it is predicted that the first half of this year will eclipse the tremendous volume of construction during the corresponding period last year.

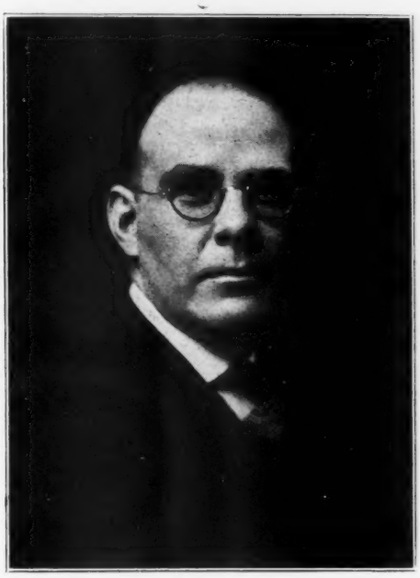
With this record breaking amount of construction, however, is coming a change in the types of new buildings. Whereas, during the last three or four years residence building has been the predominant factor, the industry is now in process of shifting more to the erection of public and industrial structures. During February residence building accounted for only 47% of the total, while commercial, educational, public and industrial types of buildings accounted for the 53% majority.

It will interest dealers in the metropolitan district to know that the amount of February building contracts in New York state and northern New Jersey was an increase of 87% over February, 1923. Indeed, the February figure, $108,052,600, was 21% greater than the monthly average for all of last year. Such a building total is unprecedented for what is usually the stormiest month of the year, and is certainly indicative of an unusually active constructive period for the next few months.

At this season of the year, just at the beginning of spring, when the demand for building materials opens up with full force, prices are usually strong and are, as a rule, more likely to increase than any other time of the year. At this time last year the material market was far from a state of stability. Prices in nearly every department were jumping every few days. This continued up to early summer, when a reaction in demand occurred. This was due in great measure to apprehension on the part of prospective builders, engendered by the price increases. No one in the industry wants to see a repetition of that cycle of rising and falling prices, with its inevitable effect on building. In order to keep the volume of construction at a steady pace it is important that manufacturers as well as wholesalers and dealers endeavor to keep the material market and the price situation as stable as possible.

First-hand information from authoritative sources in the Ohio finishing hydrate district shows that reserve stocks are unusually low for this season at all the plants. The unprecedented winter demand has kept the plants going full blast and most of them are now working both day and night in an endeavor to supply the trade and at the same time pile up a reserve to take care of the big spring demand which is sure to follow. The car supply is fair, though often spasmodic. Prices are steady. Dealers should watch their stocks and keep orders well ahead of requirements if they would avoid repeating the experience of former years, of being left without lime when they most need it.

One of the largest cement companies has published charts and figures on cement shipments last year as compared with 1922, with the object of showing the necessity of anticipating requirements before the rush season when everyone seems to want materials at once. Last year cement shipments were 136,000,000 bbl., which was about 18,000,000 bbl., or 15%, ahead of 1922. The chart referred to shows that 68% of this 18,000,000 bbl. increase was shipped before May 1. There is every indication that the demand for cement will be at least equal to and perhaps exceed that of last year. The demand is getting up rather close to mill capacity, but the manufacturers can supply the demand, provided they are able to make shipments. This depends partly on the railroads, but largely on the buyers of cement. Last year at this time all transportation records were being broken, but at present even the high number of car loadings of a year ago are being exceeded. The demand is without question already here and will grow stronger during the next two or three months. Dealers will do well to keep their cement storage filled, bearing in mind that cement is one of the first and most important materials on every job.—*Trade Review of Tompkins Brothers.*



H. J. Love, secretary of the National Slag Association

A Re-Constructed Stone

A BRITISH firm has recently put on the market a "re-constructed" stone in which the color and markings are permanent and go right through the stone.

Besides taking a brilliant polish, it is also suitable for clear-cut letters, as there is no question of cracking or crazing. The hydraulic pressure under which the material is produced is from 2 to 3 tons per sq. in.

It is supplied in panels either with squared edges, rounded or chamfered, in sizes 36 in. by 18 in. by 9/16 in., or in any multiple of these dimensions.

When Henry Ford Was in the Gravel Business

A DETROIT dispatch to various newspapers says that Henry Ford got his start in the gravel business, in which information there may be aid and comfort for some of the rest of us who are trying to get a start in the same way. The papers say:

Henry Ford hauled gravel all day long with a team and received $5 from the village of Springwells, which employed him. However, it wasn't this week that this happened, nor last week, but it was 25 years ago, in December, 1899, to be exact. Maybe that's when he got the $5 a day idea.

It is all set down in the annual itemized statement of the township board of Springwells, which came out of its quarter century-old hiding place recently when John Warncke, a Detroit florist, was a witness in a street opening case in circuit court.

At that time Mr. Ford had a gravel pit on his farm and sometimes he sold gravel to the township. On October 16, 1899, Mr. Ford took in $15.25 for 61 loads of gravel.

William Ford, a relative of Henry Ford, worked for the township back in those days as an overseer. He also was forced to do some work on the roads now and then and his daily stipend ran into three figures—$1.50 a day.

John Archer, later sheriff of Wayne county, was then in the paving business. He was paid $221 for 20 carloads of gravel in the winter of '99. Gravel now costs around $175 a car and the freight rates today run higher than the expense of a whole carload 25 years ago.

National Slag Association Elects Officers

THE NATIONAL SLAG ASSOCIATION held its seventh annual meeting, at the Bureau of Standards and the Bureau of Public Roads, in Washington, D. C., on March 28 and 29.

During the annual business sessions the following officers were elected for the ensuing year: President, C. L. McKenzie, Duquesne Slag Products Co., Pittsburgh, Pa.; vice-president, C. E. Ireland, Birmingham Slag Co., Birmingham, Ala.; secretary-treasurer, H. J. Love, 933 Leader building, Cleveland, Ohio.

Comments From Rock Products Readers

Letters and Extracts of Letters to Rock Products Editors

HEREWITH is a page for our readers to express their views on any subject relating to the industries. The editors are often guilty of using ideas given them by readers in their own editorial work; but this page is for the reader to express *his own* ideas in his own words. Naturally the editors assume no responsibility for the views here expressed.

Crushed Limestone vs. Slag for Concrete Aggregate

By JOHN W. STULL
President and Treasurer, Liberty Lime and Stone Co., Rocky Point, Va.

A GREAT many statements and claims are being made these days in favor of blast furnace slag as a concrete aggregate. And these are becoming so far reaching that the tendency might become, on the part of those who have the making of concrete specifications, to assume that slag is a good coarse aggregate for the mix regardless of the purpose for which a specification is being made. This would be a dangerous assumption and one which the engineering profession should discourage as being contrary to either theory or experience.

Blast furnace slag has its place in the fields of engineering, but it cannot be successfully used as a substitute for crushed limestone in all of the various forms of artificial structures. It can be readily seen that this is true when we follow this slag all the way from the furnace to the structure of which it is to become a part. A molten mass inside of an iron or steel furnace is mainly composed of sand and lime and clay all combined in the process of smelting ores. This mass being lighter than the metal in the furnace is drawn off into ladles and dumped in piles to cool. It then becomes commercial slag which can be used as a cheap substitute for crushed limestone, but it can never be made to compete favorably with the latter as a concrete aggregate for the following reasons:

Not any two ladlefuls have exactly the same consistency and the texture after cooling depends entirely on atmospheric conditions at the time the molten mass was dumped out of the ladle. Hence in every slag dump there is to be found every sort and condition of physical texture. Some of the mass will be hard, compact and heavier than any limestone while some will be porous and soft and light. Also it will be found that the entire mass is extremely brittle.

It appears that in the testing of concrete for comparison the official findings reported are sometimes so misleading as render the report worthless. In one report it is stated that the weight of blast furnace slag has little, if any, effect upon the strength or wearing property of the resulting concrete. This may be and it probably is true in a sense. But further on in this same report it is stated that a definite wearing test could not be obtained for the reason the slag chipped off the corners of the blocks that were being tested.

It is not stated in the report that this chipping was due to the extreme brittleness of slag, but this is the true reason and it is here that crushed limestone very greatly surpasses slag as a coarse aggregate for concrete. You can't dig into it with a pick and you can't drive a chisel far into it and pry out great pieces as is frequently seen to be possible where slag was used. With a sledge hammer and a chisel bar two men could tear up yards of a concrete road or pavement in a very short time where the aggregate used was slag, but the job could not be done in this way if crushed limestone had been used.

Furthermore, the wide range of difference in hardness between the individual pieces of slag in a pile renders it undesirable for use in concrete where absolute dependability is to be guaranteed, and no experienced engineer would here accept it. There are many well known ways of using furnace slag to advantage, such as the making of cement and bricks and tile and cheap ballast and protected concrete walls of steel frame buildings and the base for reinforced concrete floors and roofs, but it is a challenge to the intelligence and experience of the engineering profession for any one to assume that this brittle and varying material is the equal of crushed limestone for concrete structures that are to be exposed to the thud of modern traffic on either railroads, highways or streets.

L. D. Gilbert in Australia

A LETTER from Australia informs us that L. D. Gilbert, formerly of the Southwestern Portland Cement Co., at Victorville, Calif., and more recently with the Sandusky Cement Co., at Cleveland, Ohio, is now senior member of the firm Gilbert, McAuliffe Pty. Ltd., Melbourne, Victoria, Australia, cement plant and pulverized fuel engineers, representing the Fuller-Lehigh Co., the Edge Moore Iron Co., the Williams Patent Crusher and Pulverizer Co., the Bates Valve Bag Co. and Clyde lime hydrator (H. Miscampbell, Duluth, Minn.). Mr. Gilbert is engineering director of the firm.

Rock Products Endorsed!

KINDLY send me another copy of the last issue of ROCK PRODUCTS (March 8.) A couple of quarrymen were in the office Saturday and after they left we missed our copy.

Respectfully yours,
H. C. S——V. P.
U. B. & T. Co.

P. S.—Please send this copy to my home address.

Dr. Platzmann, German Portland Cement Authority in Afghanistan

DEAR MR. R——: You will be astonished at receiving a letter from me from Afghanistan in the middle of Asia. Being charged with the erection of a cement mill near Kabul by the Afghan government I am glad to profit by the occasion to become acquainted with countries nearly unknown to Europeans, but most interesting in political, technical and economic matters.

I have traveled from Berlin over the Riga-Moscow - Tashkent - Samarkand - Bokhara-Herat route till I arrived here (Herat) on December 21, starting from Berlin October 31. The march will continue on horse-back (Afghanistan being today without any railway) to Kandahar to Kabul, the capital of the Afghan kingdom—a ride of nearly 800 English miles.

I hope to send you soon an article on Afghan quarrying methods and one on a new method of separating lime from dolomite.

Living costs here are more than cheap. You will be astonished to hear that 4 lb. of meat can be bought for one rupee of silver (25 rupees being approximately one English pound—about $4.50).

No Europeans are to be seen; the state of the country and the natives being still a very low one; but now the ruling king, Amanullah Khan, is anxious to bring his country to a high degree of European culture.

There will be opportunities here for American manufacturers whom I will be glad to represent. The things needed are glass, raw materials for building, colors, chemical and pharmacopœial materials, etc. I expect to be in Kabul for a year and a half.

DR. C. R. PLATZMANN.

Editorial Comment

Competition in Cement

It must be a kind of grim joke to portland cement manufacturers to see newspaper tirades on the "cement trust" and at the same time know of the tremendous activity in promoting new cement-mill projects in every part of the country. Cement manufacturers are optimists, or they would not be financing the best organization in the world to increase and perfect the use of portland cement. Yet they *must* feel, at times anyway, some doubt as to the success of these promotional efforts in keeping ahead of the production looming up in the next two or three years. From our opportunities to see the industry as a whole, "we'll tell the world" there is *some* competition.

An Optimistic Outlook

The flurry and forebodings in connection with political scandals at Washington appear to be subsiding and both business and the general public are going about their concerns *just about the same as last year.* It is doubtful if any one really expects a much better year for the rock products industry, or for industry in general, yet there is every evidence now that this year will be better. The season in the North has been unusually backward, yet the chart below shows that the movement of sand, gravel and crushed stone has been a little better than last year and more regular. We shall continue to publish this chart, brought up to date, from time to time, as it is the best index available of the general state of the rock products industry.

Imported Cement

Cement manufacturers, especially those on the West Coast, are having to meet competition of a kind very hard for any business to meet. The local markets are liable to be completely upset any day in the week by the arrival of cargos of cement, the amount of which available, or en route on the high seas, is known to few, and the price of which may be anything over and above the cost of freight. Because of the leniency American manufacturers have always shown in the matter of cancellation of contracts, a big gambling element is thus introduced in an essential and basic industry.

This is a condition that deserves the earnest study and consideration of every one who has the welfare of American industry at heart. The most incomprehensible thing about this problem is the active effort of the West Coast labor unions to keep off a protective tariff on portland cement. They certainly are opposed to the introduction into this country of Chinese and Hindu labor; and wherein does imported cement differ in principle from labor importations?

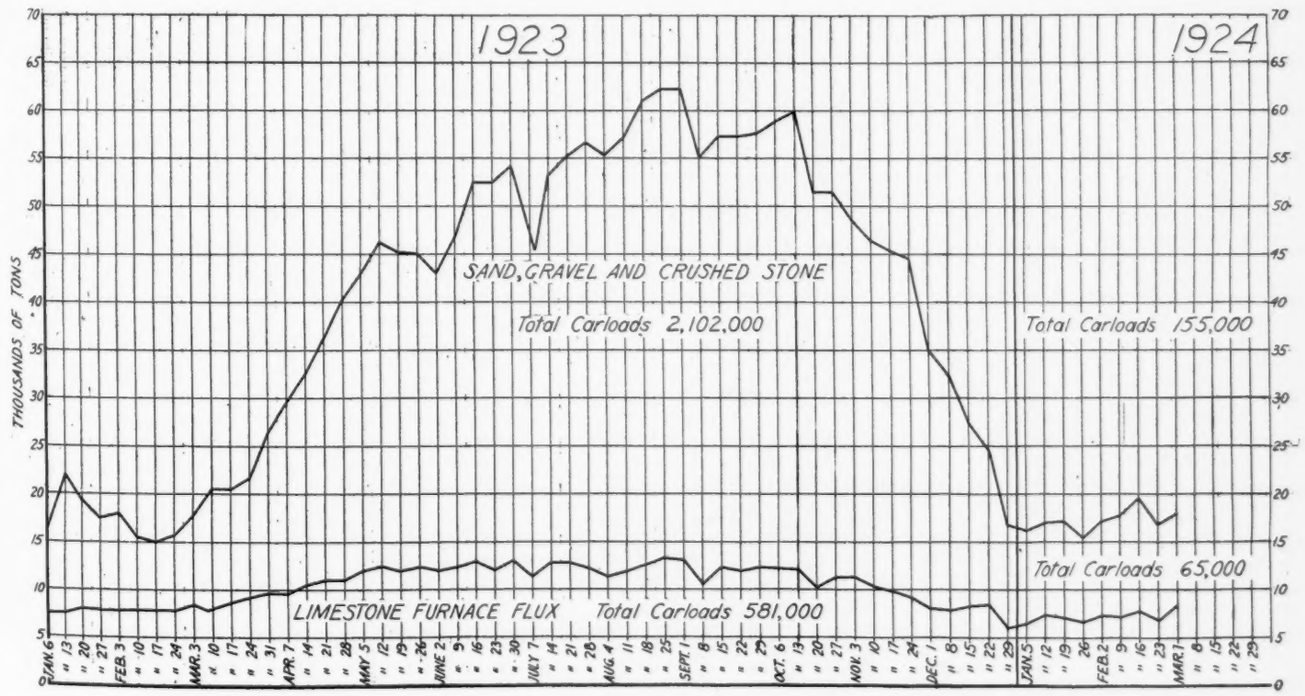


Chart showing car loadings of sand, gravel, and stone 1923 to March 1, 1924

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Buffalo, N. Y.	1.50 per net ton all sizes					
Coldwater, N. Y.	1.50 per net ton all sizes					
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Walford, Pa.	.....	.....	1.30	1.45	1.55	1.55
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.75	.....	1.75	1.50	.....	.....
Buffalo, Iowa	.90	1.35	1.25	1.15	1.25	1.25
Cypress, Ill.	1.20	1.35	1.35	1.20	1.20	1.10
Dundas, Ont.	.75	1.10	1.10	1.10	.95	.95
Gary, Ill.	1.10	1.40	1.10	1.10	1.10	1.10
Greencastle, Ind.	1.25	1.25	1.15	1.05	1.05	1.05
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
St. Vincent de Paul, P. Q.	.90	1.35	1.00	.90	.90	1.00
Sheboygan, Wis.	.90	.....	1.10	1.00	.....	.....
Stone City, Iowa	.75	.....	1.50†	1.40	1.30	.....
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Canada	1.90‡	2.25‡	2.25‡	2.25‡	2.00‡	2.00‡
Waukesha, Wis.	1.15	1.15	1.15	1.15	1.15	1.15
SOUTHERN:						
Alderson, W. Va.	.60	1.60	1.60	1.50	1.40	.....
Bridgeport and Chico, Texas	1.10	1.60	1.35	1.35	1.25	1.25
Cartersville, Ga.	1.75	1.50	1.50	1.15	1.15	1.10
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Graystone, Ala.	Crusher run with fines out, 1.00 per net ton					
Graysville, Ga.	1.00	1.00	.....	.85@1.00	.85@1.00	.....
Rock Crusher, Ky.	1.50	1.25	1.25	1.25	1.25	1.15
WESTERN:						
Atchison, Kans.	.50	2.10	2.10	2.10	2.10	1.60‖@2.00
Blue Spr'gs & Wymore, Neb.	.20	1.45	1.45	1.35@1.40	1.25@1.30	1.20
Cape Girardeau, Mo.	1.35	.....	1.25	1.25	1.00	.....
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.60	1.35	1.15	1.00	.....
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.40@1.50	1.35@1.40	1.35@1.40
Dresser Junction, Wis.	1.00	1.00	2.25	2.00	1.75	.....
El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	.....
E. Summit, N. J.	1.50	2.00	1.80	1.40	1.40	.....
Eastern Massachusetts	.85	1.75	1.75	1.40	1.40	1.40
Eastern New York	.75	1.50	1.50	1.30	1.40	1.30
Eastern Pennsylvania	1.25	1.55	1.50	1.40	1.40	1.40
Meriden, Middlefield, New Britain, Rocky Hill, Conn.	.60	1.60	1.35	1.15	1.00@1.10	1.00
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Richmond, Calif.	.....	.....	1.65*	1.50*	1.50*	.....
Springfield, N. J.	1.80	2.00	2.00	1.75	1.60	1.60
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Columbia, S. C.	.50	.....	2.00	.....	1.60	.....
Eastern Penna.—Sandstone	1.25	1.55	1.45	1.25	1.25	1,25
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.	.75	2.00	2.00	1.35	1.35	1.25
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@2.00

*Cubic yd. †1 in. and less. ‡Prices include 90c freight. ‖Rip rap per ton.

Agricultural Limestone

(Pulverized)

Branchton, Pa.—100% thru 20 mesh; 80% thru 50 mesh; 60% thru 100 mesh (Four Leaf Clover Brand); sacks, 5.00; bulk	3.50
Hillsville, Pa.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; 94% thru 50 mesh; sacks, 5.00; bulk	3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Watertown, N. Y.—Analysis 96-99% $CaCO_3$; 0.02% $MgCO_3$—90% thru 100 mesh, bags, 4.50; bulk	3.00
Rockdale, Mass.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
West Stockbridge, Mass.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
Alton, Ill.—Analysis, 98% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 100 mesh	4.50
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 80-lb p. sacks 5.00; bulk	3.50
Piqua, Ohio—Total neutralizing power 95.3%; 100% thru 10, 60% thru 50; 50% thru 100	2.10@ 2.25
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.00; bulk	3.50
100% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Mayville, Wis.	2.35
Knoxville, Tenn.—80% thru 100 mesh, **bags, 3.95; bulk**	2.70
80% through 200 mesh, bags 4.75; bulk	3.50
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200 lb. burlap bag, 4.00; bulk	2.75
Colton Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00

Agricultural Limestone

(Crushed)

Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh	1.50
Cartersville, Ga.—Analysis, 60% $CaCO_3$; 38% $MgCO_3$—all passing thru 10 mesh	1.50@ 1.75
Carthage, Mo.—Analysis, 98½% $CaCO_3$; 100% thru 10 mesh, 30% thru 100 mesh	1.75
Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 100 mesh	1.10
Cypress, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$; 50% thru 50 mesh	1.25
Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh	1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 83% thru 10 mesh; bulk	**1.25**
Milltown, Ind. — Analysis, 91.95% $CaCO_3$, 4.87% $MgCO_3$; 36% thru 100 mesh, 43.2% thru 50 mesh	1.45@ 1.60
Monroe, Mich.—Analysis, 51.91% $CaCO_3$, 44.17% $MgCO_3$; agricultural limestone meal, 3/16 in. to dust, 30% thru 100 mesh	1.60
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	**.80@ 1.40**
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	**.75**
Bridgeport and Chico, Texas—Screenings from ⅛ in. down to flour	1.50
Alderson, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh	**1.50**

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va.	2.25@ 2.50
Cedarville, N. J.—Damp	1.75
Dry	2.25
Cheshire, Mass.—24 mesh	5.00
40 mesh	6.00
100 mesh	7.00
Columbus, Ohio	1.50@ 1.75
Hancock, Md.—Damp	1.50
Dry	2.00
Mapleton, Pa.	2.25@ 2.50
Mapleton Depot, Pa.	2.50
Massillon, Ohio	3.00
Michigan City, Ind.	.50
Millville, N. J.	2.00
Mineral Ridge, Ohio	2.50
Ottawa, Ill.	1.25@ 1.50
Pacific, Mo.	2.25@ 3.00
Pittsburgh, Pa.—Dry	4.00
Damp	3.00
Ridgway, Pa.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
Sands, Pa.	2.50
San Francisco, Calif.	3.00@ 3.50
St. Louis, Mo.	2.25@ 3.00
South Vineland, N. J.—Damp	1.75
Dry	2.25
Thayers, Pa.	2.50
Utica, Ill.	1.25@ 1.50
Zanesville, Ohio	2.50
Foundry Sand:	
Albany, N. Y. — Molding fine, brass molding	3.00
Molding coarse	2.75
Sand blast	4.50
Arenzville, Ill.—Molding fine	1.50@ 1.70
Brass molding	1.75
Beach City, Ohio.—Core, washed and screened	**2.00@ 2.50**
Furnace lining	**2.50@ 3.00**
Molding fine and coarse	**2.25@ 2.50**
Cheshire, Mass.—Furnace lining, molding fine and coarse	**5.00**
Sand blast	**5.00@ 8.00**
Stone sawing	**6.00**
Cleveland, Ohio—Molding coarse	1.50@ 2.00
Brass molding	1.50@ 2.00
Molding fine	1.50@ 2.25
Core	1.25@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge and So. Hts., Pa.	1.25	1.25	1.15	.85	.85	.85
Buffalo, N. Y.	1.10	.95			.85	
Farmingdale, N. J.	.48	.48	.75		1.10	
Machias, N. Y.	.85	.75	.75	.75	.75	.75
Pittsburgh, Pa.	1.25	1.25	1.00	.85	.85	.85
Washington, D. C.—Rewashed, river		.75	.75	1.60	1.40	1.20
CENTRAL:						
Barton, Wis.		.50		.70		.70
Beloit, Wis.		.70			.80	
Columbus, Ohio	.85	.85@1.20	.75	.75@1.00	.75	.75@ .90
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
			Unwashed ballast, .50 ton			
Eau Claire, Wis.		.53d				.93@ .98d
Elkhart Lake, Wis.	.60	.50	.60	.70	.70	.70
Grand Rapids, Mich.		.50		.80		.70
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50				.75
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	1.00	.45@ .55	1.45@1.55	1.45@1.55	1.45@1.55	1.45@1.55
Mankato, Minn.	.40a	.40	.50†		1.25	
Milwaukee, Wis.	1.11	1.11	1.36	1.36	1.36	1.36
Moline, Ill.	.60	.60	Concrete gravel, 40% G., 60% S., .90			
St. Louis, Mo., f.o.b. cars	1.20	1.45	1.65§	1.45		1.45‖
Terre Haute, Ind.	.75	.60	.90	.90	.90	.75
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Winona, Minn.	.40	.40	1.50	1.25	1.10	1.10
			(.05 ton discount 10 days)			
SOUTHERN:						
Brookhaven, Miss.; Roseland, La.		.50			1.00	
Charleston, W. Va.	all sand 1.40 f.o.b. cars		all gravel 1.50 f.o.b. cars			
New Martinsville, W. Va.	1.00	1.00		1.20		.80
WESTERN:						
Baldwin Park, Calif.		.25@ .40	.50@ .80	.50@ .80	.50@ .80	
Crushed Rock			.90@1.10	.65@1.00a	.60@ .90	
Kansas City, Mo.			Kaw river sand .75 per ton f.o.b. plants			
Los Angeles, Calif.	.30	.70	1.35	1.25	1.15	
Pueblo, Colo.	1.10*	.90*		1.75*		1.60*
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*		1.50*	1.50*
Webb City, Mo. (flint)	.75	.75	.25@ .75b	.85b	1.25c	1.15c

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Brookhaven, Miss., Rosel'd, La.	75	.50			1.25	
Dudley, Ky.‡	1.05	1.05		1.00		
Elkhart Lake, Wis.	.60	.50				
Fishers, N. Y. (filter sand)	.75	.60@ .75		.60		
Gainesville, Texas		.95				.55
Grand Rapids, Mich.				.55		
Hamilton, Ohio					.70	
Hersey, Mich.				.55		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas	1.10					.55
Mankato, Minn.			Pit run gravel, .50			
Moline, Ill.	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.						.60
St. Louis, Mo.						1.55
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.50	.60	.60
York, Pa.		.95@1.20	(crushed rock)			
Zanesville, Ohio		.60	.60			

*Cubic yd.; † concrete mix; §⅝ in. and less; ‡crushed rock; ‖2½ in. and less; (a) ¾ in. and less; (b) flint chats; (c) crushed flint; (d) from stock pile.

Miscellaneous Sands

(Continued from preceding page)

Columbus, Ohio—Core	.30@	2.00
Furnace lining		2.50
Molding coarse		1.75
Molding fine		2.00
Sand blast	3.50@	5.00
Brass molding		2.50
Delaware, N. J.—Molding fine		2.00
Molding coarse		1.90
Brass molding		2.15
Dunbar, Pa.—Traction (mill)		2.25
Dundee, Ohio.—Glass, core, sand blast traction		2.50
Molding fine, brass molding (plus 75c for winter loading)		2.00
Molding coarse (plus 75c for winter loading)		1.75
Eau Claire, Wis.—Core, roofing sand		1.25
Sand blast		3.25
Franklin, Pa.—Core		2.00
Furnace lining		2.50
Molding coarse		2.00
Brass molding		2.75
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled		.85
Bank run		.65
Kansas City, Mo.—Missouri river core		.80
Kasota, Minn.—Stone sawing (white glass sand)	1.50@	2.00
Mapleton Depot, Pa.—Molding fine	2.25@	2.50
Traction	2.00@	2.25
Roofing sand		2.25
Massillon, Ohio—Molding fine, coarse, furnace lining and core		3.00
Traction		2.75
Michigan City, Ind.—Core	.50@	.55
Traction		.40
Millville, N. J. Core		2.00
Mineral Ridge, Ohio—Core		2.25
Furnace lining		1.75
Molding fine and coarse, roofing sand, sand blast, stone sawing		2.00
Traction		1.85
Montoursville, Pa.—Core		1.50
Traction		1.25
Brass molding	1.50@	2.00
New Lexington, Ohio—Molding fine		2.75
Molding coarse		2.50
Ottawa, Ill. — Core, furnace lining, steel molding		1.50
Roofing sand	1.50@	4.50
Sand blast		4.50
Ottawa, Minn.—Crude silica sand	.75@	1.00
Pacific, Mo.—Core, furnace lining	1.00@	1.25
Molding fine	.90@	1.00
Stone sawing	1.00@	1.75
Molding coarse	.85@	1.00
Ridgway, Pa.—Core		2.00
Furnace lining, molding fine, molding coarse		1.25
Traction		2.25
Rockwood, Mich.—Roofing sand		3.00
Sand blast		3.75
Round Top, Md.—Roofing sand		2.25
Traction		1.75

Miscellaneous Sands

(Continued)

San Francisco, Calif. (washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@	3.5o
(Direct from pit)		
Furnace lining, molding coarse, sand blast		3.60
Stone sawing, traction		2.30
Tamalco, Ill.—Molding coarse	1.40@	1.60
Brass molding		1.75
Thayers, Pa.—Core		2.00
Furnace lining		1.25
Molding fine and coarse		1.50
Traction		2.25
Utica, Ill.—Furnace lining	1.00@	1.50
Molding fine		.75
Molding coarse		.85
Warwick, Ohio—Core, green, 1.75@ 2.00; dry	2.50@	3.00
Furnace lining, green 2.00; dry		3.00
Traction		2.50
Zanesville, Ohio—Molding fine		1.75
Brass molding	1.75@	2.00
Molding coarse		1.50
Furnace lining, molding steel		2.00
Traction		2.50

Crushed Slag

City or shipping point EASTERN:	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, O.	2.05	1.45	1.45	1.45	1.45	1.45	1.45
Jackson, O.		1.35		1.35	1.35	1.35	1.35
Toledo, O.	1.50	1.35	1.50	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ashland, Ky.		1.55	1.55	1.55	1.55	1.55	1.55
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing	Masons'	Agricultural	Chemical	Ground burnt lime,		Lump lime,	
EASTERN:	hydrate	hydrate	hydrate	hydrate	Blk.	Bags	Blk.	Bbl.
Bellefonte, Pa.		10.50•	10.50•	10.50•	9.00		8.50	1.80
Buffalo, N. Y.				12.00				
Berkeley, R. I.			12.00					2.30
Lime Ridge, Pa.							5.00a	
Williamsport, Pa.			10.00				6.00	
York, Pa. (dealers' prices)		10.50	10.50	11.50			8.50	1.65b
CENTRAL:								
Cold Springs, Ohio	12.50	11.00	10.00		9.00	11.00‖	10.00	
Delaware, Ohio	12.50	10.00	9.00	11.00			9.00	1.60
Gibsonburg, Ohio	12.50				9.00			
Huntington, Ind.		11.00	10.00		9.00		10.00	1.60c
Luckey, Ohio	12.50‡							
Marblehead, Ohio		11.00	10.00				10.00	1.60d
Marion, Ohio		11.00	10.00				10.00	1.80†
Mitchell, Ind.		12.00	12.00	12.00	11.00		10.00	1.70c
Sheboygan, Wis.							9.50	10.25f
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00		
Woodville, Ohio	12.50‡	11.00‡	9.50‡	11@14.50	9.00	10.50‡	9.00	1.60
SOUTHERN:								
Erin, Tenn.							8.00	1.25
El Paso, Texas							9.00	1.50
Graystone and Wilmay, Ala.	12.50	11.00				.67½g	8.50	1.50
Karo, Va.							7.00	1.50
Staunton, Va.					7.50	9.00		1.25
Varnons, Ala.	11.00	11.00	11.00	11.00		8.50	8.50	15.00f
Zuber and Ocala, Fla.	12.50		10.00				12.00	1.65
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							15.00	
San Francisco, Calif.	21.00		17.00				19.50	2.50
Tehachapi, Calif.							13.00	2.10e

•Paper sacks; †180-lb. net, non-returnable metal barrel; ‡50-lb. paper bags, terms 30 days net, 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice; ‖ 80-lb. paper bags; (a) F. O. B. kilns; (b) 200 lb. net, 2.65, 300 lb. net; (c) wooden bbl.; (d) wooden, 1.60, steel, 1.80; (e) wooden bbl., steel bbl., 2.20; (f) ton; (g) per bag of 90 lb

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Asheville, N. C.—Best white and 200-mesh (per ton)		8.00
Yellow (per ton)		9.00
Red (per ton)		13.00
Baltimore, Md.—Crude talc (mine run)	3.00@	4.00
Ground talc (20-50 mesh), bags		10.00
Cubes		55.00
Blanks (per lb.)		.08
Pencils and steel workers' crayons, per gross		1.25
Chatsworth, Ga.—Crude talc (grindings		4.50
Ground (80 mesh)		8.00
Ground (150-200 mesh)	8.00@	12.00
Emeryville, N. Y.—(325 mesh), bags		14.75
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags		18.00
Henry, Va.—Crude talc (mine run) per 2000-lb. ton	2.75@	4.00
Ground (150-200 mesh), bags	8.50@	14.00
Keeler, Calif. — (150-200 mesh); carloads, 6000-lb. (bags extra)	18.00@	30.00
Los Angeles, Calif.—Crude	15.00@	22.00
Marshall, N. C.—Crude (gray)	4.50@	5.00
Ground (60-80 mesh) (bags extra)	6.50@	7.50
Ground talc (150-200 mesh); bags	8.00@	12.00
Natural Bridge, N. Y.—Ground talc (300-325 mesh), 200 lb. bags	13.00@	15.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@	10.00
Ground talc (150-200 mesh), bulk	10.00@	22.00
Vermont—Ground talc (20-50 mesh); bags	7.50@	8.50
Ground talc (150-200 mesh); bags	10.00@	16.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	7.50@	10.00
(Bags extra)		
Ground talc (150-200 mesh), bulk	10.00@	22.50
(Bags extra)		
Pencils and steel workers' crayons, per gross	1.20@	2.50

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%, bags		8.50
Bulk		6.50
Gordonsburg, Tenn.—B.P.L. 68-72%.	5.50@	6.50
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		5.50

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$10.00	$8.10	$7.80
24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10	12.60	11.00	8.70	8.75
18x10	12.60	11.00	8.70	8.75
18x 9	12.60	11.00	8.70	8.75
16x10	12.60	11.00	8.40	8.75
16x 9	12.60	11.00	8.40	8.75
16x 8	12.60	11.00	8.40	8.75
18x12	12.60	11.00	8.70	8.75
16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x 8	11.10	10.50	8.10	7.80
14x 7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Wales, Tenn.—B.P.L. 70%.....		7.75
Per 2000-lb. ton		
Barton, Fla.—Analysis, 50-65% B.P.L.	3.50@	8.00
Mt. Pleasant, Tenn.—B.P.L. 65%.....	6.50@	7.00
Twomey, Tenn.—B.P.L. 65%.....	6.50@	7.50

Florida Soft Phosphate

(Raw Land Pebble)

Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L.	2.25
70% min. B.P.L.	2.50
72% min. B.P.L.	2.75
75/74%	3.75
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

Per Ton

Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines..	22.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines..	23.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Slate granules		6.50
Haddam, Conn. — Felstone buff	12.00	12.00
Harrisonburg, Va.—Blk. marble (crushed, in bags	12.50@18.00	12.50@18.00
Ingomar, Ohio (in bags)		4.00@20.00
Mertztown, Pa. (granite) bags, $10.00; bulk		8.00
Milwaukee, Wis. (del.)..		16.00@30.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsburg, N. J.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.—2000 lb.		8.00@12.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b. cars, granite	4.50@ 6.00	4.50@ 6.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@35.00
Ensley, Ala. ("Slagtex")	11.50	22.50@33.50
Friesland, Wis.	21.00	32.00
Omaha, Neb.	18.00	30.00@40.00
Portland, Ore. (Del.)	21.00	45.00@55.00
Puyallup, Wash.	20.00	30.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
Salem, Ore.	23.00	35.00@75.00
Watertown, N. Y.	18.00@21.00	32.00@35.00
Wauwatosa, Wis.	15.00@16.00	28.00@65.00
Winnipeg, Can.	15.50	

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	15.00@16.50
Dayton, Ohio	13.50
Grand Rapids, Mich.	11.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	13.50
Plant City, Fla.	10.00@15.00
Portage, Wis.	15.00
Rives Junction and Saginaw, Mich.	12.00
San Antonio, Tex.	12.50@14.00
Syracuse, N. Y. (delivered at job)	20.00
F.o.b. cars	15.00@16.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, per Ton	
	Finishing	Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	20.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	20.00	19.00
Minneapolis, Minn. (white)..	25.50	21.00
Montreal, Que.	21.00	21.00
New York, N. Y.	18.20	13.10
St. Louis, Mo.	19.00	19.00
San Francisco, Calif.	22.00	.....
Seattle, Wash. (paper sacks)..	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots.

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	2.60
Boston, Mass.	.....	2.53@3.03†
Buffalo, N. Y.	.....	2.38@2.88†
Cedar Rapids, Iowa	.60	2.40
Cincinnati, Ohio	.61¾	2.37
Cleveland, Ohio	.59¾	2.39
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.44
Dallas, Texas	.51¼	2.05
Davenport, Iowa	.59¾	2.29
Dayton, Ohio	.....	2.41
Denver, Colo.	.63¾	2.55
Detroit, Mich.	.60	1.995@2.40
Duluth, Minn.	.54¾	2.25
Indianapolis, Ind.	.60¼	2.31
Kansas City, Mo.	.66¾	2.37
Los Angeles, Cal. (less 5c dis.)	.68	3.08
Memphis, Tenn.	.....	2.60
Milwaukee, Wis.	.58¾	2.35
Minneapolis, Minn.	.60½	2.42
Montreal, Canada (sks. 20c ext.)	.....	2.25
New Orleans, La.	.....	2.90
New York, N. Y.	.....	2.15@2.65†
Philadelphia, Pa.	.....	2.41@2.81†
Phoenix, Ariz.	.82½	3.30
Pittsburgh, Pa.	.54¾	2.19
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.61*
St. Louis, Mo.	.55	2.20
St. Paul, Minn.	.60½	2.42
Seattle, Wash. (10c bbl. dis.)..	.....	2.90
Toledo, Ohio	.60	2.005@2.40

NOTE—Add 40c per bbl. for bags.

*5c cash disc. 10 days.

†Prices to contractors, including bags.

Mill prices f. o. b. in Carload Lots to Contractors

	Per Bag	Per Bbl.
Buffington, Ind.	.48¾	1.95
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.00
El Paso, Tex.	.70	2.08*
Hannibal, Mo.	.....	1.95
Hudson, N. Y.	.....	2.05
Leeds, Ala.	.....	1.95
Los Angeles, Calif.	.....	2.65
Louisville, Ky.	.....	2.35
Northampton, Pa.	.....	1.95
Phoenix, Ariz.	.....	4.30†
Steelton, Minn.	.50	2.00
Universal, Pa.	.48¾	1.95

*Gross, 10c sacks and 10c per bbl. disc 10 days.

†Gross, 15c sacks and 5c per bbl. disc. 10 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	——Plaster Board—— ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Black Hawk, S. D.	3.50	.....	7.00	8.00	10.00	10.50	.....	.....	.....	.....	.....	.....	.....
Denver, Colo.	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas, Ariz.	.....	6.00	6.00	.....	13.00	.....	.....	.....	.....	.....	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	.....	5.00	10.00	10.00	10.00	.....	.....	31.00	.....	19.75	20.00	30.00
Hanover, Mont.	4.50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00*	30.75	21.00	19.37	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	16.40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags, $1.50 per ton extra (not returnable).

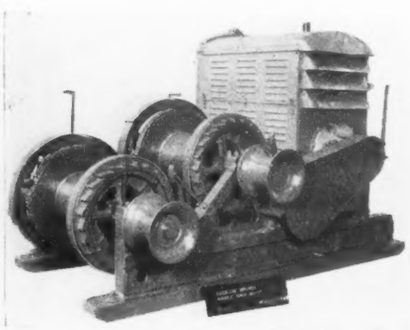
*Sanded Wood Fiber $2.50 per ton additional.

New Machinery and Equipment

New Gasoline Thomas Hoists

THE hoists built by the Thomas Elevator Co. of Chicago are well-known in the rock products industries, a great many of them being employed, especially in the operation of cableway dragline excavators. Most of these are steam driven, although a number are powered with electric motors.

Recognizing the advantages of the internal combustion engine for isolated plants, the company has recently put a line of hoists on the market with gasoline engines for the power unit. These hoists are in all principal respects counterparts of the electric hoists manufactured by the company.



New Thomas gasoline-engine-operated hoist

The company's Bulletin No. 9 shows a wide range of sizes of these hoists from a small one with only a 15 hp. motor and a line pull of 2000 lb. to a powerful machine with a 125 hp. motor which has a line pull of 15,000 lb. The lighter hoists are of the cone friction type and the heavier of the band friction type.

The control levers may be banked so that the hoist operator may stand at some distance from the machine just the same as with a steam hoist. Speeds may be changed from the standard, if desired, by merely changing the gear ratio.

A Derrick Boat for Sand and Gravel Dredging

THE cut shows a dipper dredge derriek boat built by the Clyde Iron Works of Duluth, Minn., for Robert Love & Son, Muskegon, Mich. This boat is of a type that is considerably used for dredging sand and gravel, especially in lakes and rivers where the bottom is "patchy," so that the dredge cannot work in one locality for a considerable time as a pump boat must, if it is to work economically.

The owners of this particular dredge boat say that it averages about 600 yd. per day with a crew of three men. A 1½-yd. bucket of the orange peel type is used which would indicate that the digging was not easy. In softer ground using a larger clamshell bucket, this production would be considerably increased.

New derrick boat for sand and gravel dredging at Muskegon, Mich.

Automatic Valves Which Reduce Boiler Shut Downs

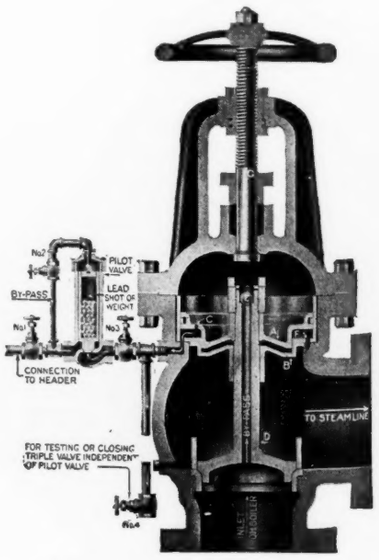
THE Golden-Anderson Valve Specialty Co., Pittsburgh, Pa., has developed an automatic, double cushioned, triple acting, non-return valve for application in main steam lines. The valve is entirely automatic in action, and a split boiler tube or broken steam pipe will cause the valve to close and isolate the boiler involved, thus allowing the other boilers to give uninterrupted service, according to the manufacturer's claims.

Should a break occur in a header or steam line, the valve on every boiler will instantly close, thus eliminating the havoc which would occur were the live steam from all the boilers permitted to escape through the break. It is also maintained that this valve equalizes the load among all the boilers automatically and makes possible the immediate location of a lagging or sluggish boiler.

The valve is fitted with special dash pots which provide against hammering, pounding or spinning, assuring smooth and durable operation. Particular attention has been paid to providing adequate strength for the constant strain and vibration of a piping system.

Referring to the sectional view of the valve, it will be noted that the outside dash pot B is securely anchored to a shoulder as a cylinder for the inside dash pot A, which is firmly fastened to valve disk D by a large lock nut. The design of the two dash pots affords a double cushion effect which prevents hammering or pounding. In case of an accident causing sudden closing of the valve, the double cushion allows an instantaneous drop of the valve to with ⅛ in. of the seat and then closing smooth under the control of the secondary cushion.

Automatic valves are usually placed on



Automatic valve to reduce boiler shut-downs

top of the boiler nozzle or installed in the steam line leading from the boiler, and in branch lines leading from the header. The automatic shot pilot valve is located adjacent to the main valve and piped into the header at about 15 ft. from main valve on its outlet side. The automatic testing feature is connected between the pilot and main valve and extended to the boiler room floor. Boiler pressure is applied underneath disk D, and the valve, being balanced, will open automatically whenever the pressure underneath the disk equals that above it. On reverse steam flow, as a result of less pressure beneath the disk D than above it, the valve will operate within 1 lb. variation.

In case of a broken steam line or header with the valve working at 150 lb. pressure and the pilot valve set for 8 lb. differential, the instant pressure above the main valve disk drops to 142 lb. or less, it will permit the pilot valve to open and release the steam from between the dash pots. The main valve will then instantly be closed by the boiler pressure accumulating above dash pot A through by-pass in the valve disk D, thereby shutting off all steam flow through the valve. The differential pressure may be decreased or increased by changing the weight of shot in the pilot valve. An 8lb. differential is usually maintained which prevents premature closing or tripping on unusual steam requirements.

The valve is equipped with hand wheel and may be closed at any time like an ordinary stop valve. It will be noted, however, that the stem is not connected to the disk, but merely bears against it. Therefore, when testing a boiler hydrostatically the automatic valve can be left in automatic position, which allows it to float during the test and avoids strain on its parts.

The valve is made by the Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.

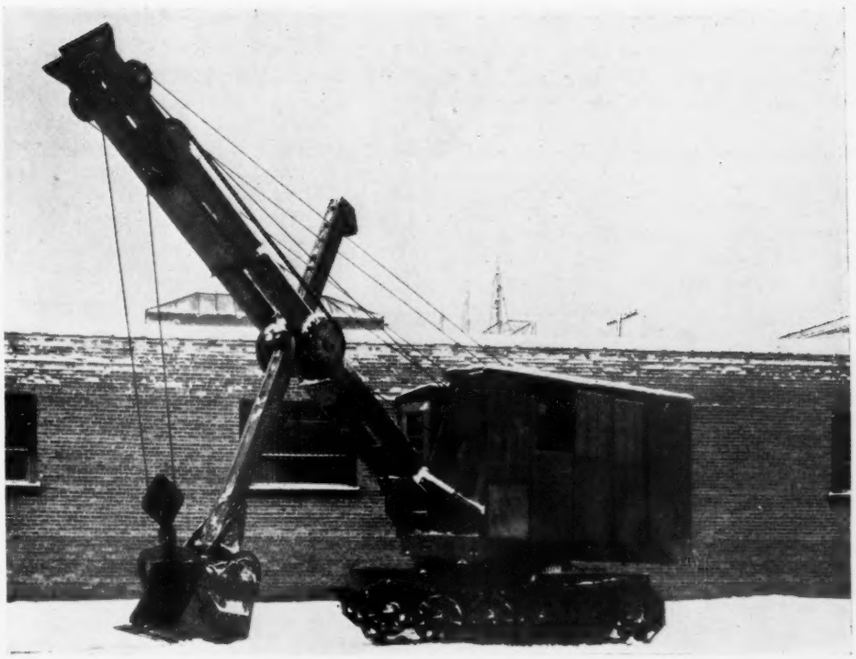
Link-Belt's New Gasoline Shovel

LINK-BELT CO. of Chicago has recently developed a shovel attachment for use in connection with their gasoline crawler crane. This shovel boom-attachment is interchangeable and provides their crane with a far greater field of usefulness. Either attachment (shovel or crane boom) can be specified as original equipment, but however specified, the interchangeability of the booms makes the machine either a gasoline crawler shovel with crane boom attachment or a gasoline crawler crane with a shovel attachment.

The dipper is ¾ yd. capacity and is made entirely of manganese steel. It has been modeled after the famous "Mesaba" type of dipper used so extensively on the Mesaba Iron range. The standard dipper stick of 15 ft long. The extremely husky boom is 24 ft. center to center.

All crowding motion is performed by a rack and pinion actuated by a very vigorous combination of the hoist and hold rope used on the ordinary clam shell bucket hoist. The full power of the 60 H. P. gasoline engine can be used in the crowding motion, making it, in this respect, superior over the usual steam machines with their small crowding engines.

The manufacturer's claim that the Link-Belt crawler crane is increasing in popularity, due to the fact that this machine is fully as fast as the steam machines and that it can be readily and at very small expense changed for clam shell, drag line bucket, shovel or pile driving work.



Link-Belt Co.'s latest development—gasoline-engine-operated shovel

Fire Brick for Lime Kilns

THE Federal Clay Products Co., Mineral City, Ohio, announces that it will specialize in the manufacture of fire brick for lime kilns, owing to an unusually heavy demand for its product in this field. The manufacture of all its other fire-clay products, however, will be continued.

In a new catalog the company gives considerable valuable information relative to specifications, shapes, and sizes of brick required for kilns. Typical of this is the data on key brick for a kiln of 43 in. inside diameter, 69 in. outside diameter. This is identified as a 13-in. key brick, being 4x5x 13x8 in.; 27 are required for a circle. Another example is the data on circle blocks for a 72-in. inside diameter kiln, 90-in. outside. This block is 4½x9x12x15 in. and 19 are required for a circle.

This company has behind it more than 35 years of experience in manufacturing what it terms "Fire Brick of Quality, Brick That Give Service," and claims to be in a position to satisfy the needs of operators at short notice, due to having in stock practically all sizes and shapes of products.

High Power Flood Light

A 5000-CANDLE-POWER acetylene flood light has been put on the market recently, which is especially adapted to outdoor plant use. It weighs only 30 lb. and stands 5½ ft. high when ready for use but has a folding standpipe so that its length when folded is 39 in. The base of the tank is 12 in. in diameter, which, together with a low center of gravity, gives it unusual stability. It will stand at an angle of 30 deg.

However, no harm is done in case the lamp is upset, rolled around or left on its side for some time, because rough handling will not cause spilling of either water or the carbide. Moreover, the light will work properly as soon as righted. This feature of the lamp is obtained through the particular design of the mixing arrangement, whereby one moving part, a plunger, automatically feeds or drops the carbide piece by piece into the water chamber, in response to the gas demand. The arrangement is such that the unused carbide cannot come in contact with the water or the water vapor.

Another feature of the light is that it will run for 10 hours without recharging, either in a continuous run or 1 hour a night, for 10 nights. It is also said that a 30-day period of disuse after charging will not affect its operation or result in any deterioration of the carbide in the charge. Use of the light after a period of idleness does not entail any manipulation of the apparatus.

An idea of the cost of operating this light is to be had from the fact that the charge for 10 hours' operation is 5 lb. of commercial carbide, which sells for about $5.40 per 100 lb. This lamp, which is known as the V G portable flood light, is manufactured by the Blake Mfg. Co., of Mansfield, Pa.

Golf Course or Gravel Pit?

ABANDONMENT of the proposed purchase of the tract now used as a municipal golf course by the city of Columbus, Ohio, was seen as result of a report to council recently that an appraisal on the portion of the tract required for extension of the waterworks filteration plant and pumping station, places the value of the land at $3,000 an acre.

This price would make the minimum cost of the tract, which is 37½ acres in extent, $112,500, and it is possible that the price might be considerably higher before condemnation proceedings were completed.

Rich gravel deposits underlie the property. The Concrete Material Co., which owns it, has a plant nearby.

While some councilmen have insisted that the tract be purchased, not as a golf course, but as a park to safeguard the waterworks plant, it is believed that a majority has wanted the tract primarily as a golf course and that this majority would not pay the price required.

If the council decides not to condemn the property, it will be available this year as a golf course, but the Concrete Materials Co., probably will start operations there in 1925, necessitating selection of a new tract for a city course.—*Columbus, Ohio, State Journal.*

Iowa Compromises on Sand and Gravel Royalty

THE controversy growing out of the ruling of the Iowa state board of conservation, by which a royalty of 3 cents a ton was asked of all sand and gravel producers who dredged from meandered lakes and rivers in the state, has been noticed in this paper from time to time. It now appears that a compromise has been effected by which the royalty is not to be collected on sand and gravel which is to be used in highway construction, in public works by municipalities and similar bodies, and on sand and gravel taken by farmers for their own use.

It is estimated that about 500,000 tons would annually pay this royalty if it were not for the exemption, but that a very large part of this tonnage will be exempt.

A considerable body of citizens, who were not otherwise interested, opposed the collection of the royalty on the ground that the dredging was really a benefit to the state. The greater part of the sand and gravel dredged was that which came down the rivers with the winter rains, and which, if allowed to accumulate, caused the rivers to overflow low lands that were being cultivated or which were occupied with buildings.

If the tonnage estimate is correct and the exemptions are as stated such a royalty would seem to be more in the nature of a "nuisance tax" than one which was of value as a producer of revenue to the state.

Asbestos in Idaho

AT an enthusiastic meeting of the Idaho-Montana Asbestos Co. held at Twin Falls, Idaho, recently, arrangements were made to secure a hand cobing expert from the Canadian asbestos mines in Quebec. The outlook of the company is promising, and it is expected that the new mill will be producing fiber by the early part of the summer.

Two Companies in Trouble Over Blasting

THE Lynn Sand and Stone Co., Swampscott, Mass., set off a blast recently which caused them trouble with their neighbors. Newspaper accounts state that 25 holes were shot under the supervision of blasting experts.

After investigation of the blast, State Fire Marshal George C. Neal of the State Police recently issued orders that the company use either smaller charges of explosive in blasts or cease operations entirely.

A Texas newspaper dispatch states that James H. Thompson has filed suit here against the Trinity Portland Cement Co. demanding $25,000 damages which he alleges resulted from blasting the company did near his home. In his petition Thompson claims the plaintiffs wrecked his home for which he wants $5000. For personal damages he asks $20,000, claiming the blasting endangered the lives of his family.

These items add interest to the article elsewhere in this issue describing tests of the vibrations from blasting at the quarry of the Interstate Crushed Stone Co., Springfield, N. J., and the remarkably complete investigation and study conducted by the General Crushed Stone Co. of Easton, Pa., at their Winchester, Mass., quarry. The results of the General Crushed Stone Co. studies were reported by John Rice, president, and Otho M. Graves, assistant to the president, at the two most recent conventions of the National Crushed Stone Association.

A transcript of these reports will be found in Rock Products, March 8, 1924, and March 10, 1923. The company has also had briefs printed of their case as presented in the Massachusetts courts.

Cement for Wisconsin Roads

A WISCONSIN newspaper gives the following startling statistics (which we have not checked):

Over 18 miles of freight cars, all loaded with cement, will move northward through Beloit, Wis., between now and next fall, railway officials stated.

This would make a train reaching from Beloit to beyond Rockford, Ill. There would be 2,200,000 sacks of cement in the 1100 cars.

Almost all of this cement is to be used in the construction of highways in the state.

Tullytown, Pa., to Have Big New Gravel Plant

THE Charles Warner Co., Morris building, Philadelphia, with headquarters at Wilmington, Del., operating a building material supply business, has acquired property at Tullytown, Penn., and will equip for sand and gravel production, including steam shovels, elevating and conveying machinery and other equipment, estimated to cost $600,000.

This company is already a large producer of sand and gravel. It also operates under the name of the West Jersey Sand and Supply Corporation, which owns a fleet of dredges in the Delaware river and wharves and extensive yards in Philadelphia.

The De Frain Sand and Gravel Co., of Philadelphia, which is owned by the same interests as the Knickerbocker Lime Co., built a huge sand and gravel plant at Tullytown about four years ago. The Penn Sand and Gravel Co. also has a modern plant there. Passengers on the Pennsylvania railroad between Philadelphia and New York have a fine view of both these operations.

The development of the sand and gravel deposits at Tullytown, which are probably part of the old bed of the Delaware river, is evidently due to the growing scarcity of sand and gravel in the river nearer Philadelphia. This continual search for, and the constant development of, new sources of sand and gravel near large cities ought to help convince sand and gravel producers that they are exploiting natural resources which are by no means unlimited, and consequently have a real value *in place* that few operators figure on in making selling prices.

Rock Products of the Holy Land

WHEREAS Palestine is lacking in timber, it is fortunate in possessing stone for many purposes. Marble and limestone and dolomite are found in the mountains, sandstone on the coast, basalt in Galilee and Hauran and granite in the Arabah Valley. Clay and lime, bricks, pottery and tiles exist in abundant quantities. In the Jordan Valley are rich strata of gypsum, while Judea contains plenty of phosphate of lime good for fertilizing purposes.

The Dead Sea is rich in minerals. Its water contains 24 per cent of salt, besides bromides, soluble chlorides, phosphates and gypsum in indefinite quantities. The potash of the Dead Sea is said to be inexhaustible—at least sufficient to supply the needs of the world for 400 years.

Jaffa has factories for limestone bricks, asbestos slabs and cement. Stone quarries are being opened at Haifa, which also has cement factories, joinery workshops and a sawmill.—*New York Tribune.*

Hearing on Sand and Gravel vs. Slag

WILL the railroads be permitted to subsidize the steel industry at the expense of sand and gravel producers? Will slag be recognized as a road-building material, which railroads will continue to haul at lower freight rates than on sand and gravel and crushed stone? Will the distances involved in hauling empty cars to the loading plants have a bearing on the measure of the freight rate levels on slag versus sand and gravel and crushed stone?

These are questions which must be determined by the Interstate Commerce Commission as a result of the hearing in Docket No. 15329, Complaint of the Pennsylvania Sand and Gravel Producers Association et al. vs. Baltimore & Ohio railroad et al., held in Pittsburgh, Pa., on March 24, 25 and 26 before Examiner Cheseldine.

The hearing was the result of efforts of the Western Pennsylvania sand and gravel producers to have the rates on sand and gravel, crushed stone and slag equalized one with the other, as well as to secure a just and reasonable basis of rates on sand and gravel from plants in western Pennsylvania to market territory in Ohio, New York and West Virginia.

The proposition developed into a three cornered fight at the hearing, with the sand and gravel producers on the one side, under the leadership of Edwin Brooker, commerce counsel, Washington, D. C., assisted by Beecher W. Waltermire of Columbus, Ohio, and Willis Crane of Washington, D. C., and slag producers represented by U. S. Steel Corp. traffic men and attorneys on the other side, with the traffic and legal representatives for the 21 defendant railroads occupying the center of the stage and maintaining what appeared to be a passive attitude, as if afraid to support their oft repeated policy, that slag rates should be increased to the sand and gravel basis.

As far as evidence goes, it was all in favor of the sand and gravel producers. Forty-one exhibits were presented for their account by Witnesses Dann, McComb, Giles, Kramer and Brooker. The bulk of the producers' testimony indicated clearly the damage they have suffered due to lower freight rates on slag, also proving that road-building materials in question were competitive materials, having the same transportation characteristics. The technical freight rate data was presented by Witness Brooker and demonstrated clearly the discriminations which existed in the rates on slag and crushed stone as compared with rates on sand and gravel, as well as the fact that present rates on sand and gravel were excessive and unreasonable. Exhibits were presented showing that from western Pennsylvania plants have higher rates than those charged on road-building materials in all other territories, even though figures showing traffic density as well as evidence covering transportation conditions, all prove conclusively that the rates on other traffic are and should be lower in the Central states than in the West and South, while on road-building materials the opposite is true and higher rates are published from western Pennsylvania plants.

The evidence and exhibits of the railroads, 13 in number, merely reflected their revenues under existing rates and a lack of uniformity in the rates.

New Iowa Sand Plant

ONE of the most important and far-reaching epochs in local industrial circles is the new plant of the Capital City Sand Co., which is nearing completion just north of Des Moines, on the Central Iowa railway. This plant promises to be an innovation in crushing and screening equipment. It has been especially designed as a labor saver, Sauerman slack-line cableway, a 100-ft. steel mast, 75 ft. of steel tower and bins and is absolutely the latest improved, all-steel type of plant known to the crushing and screening industry. It is a model in construction, efficient to smallest detail and a labor-saver in every essential.

This plant will enable the company to produce sand and gravel of perfect quality, meeting any concrete specification required, or any demand by the Iowa State Highway Commission. The new plant, which is to be completed in the near future, is attracting state and even nation-wide attention. It has many original features heretofore untried in the industry and is naturally being watched by sand and gravel men all over the country. The plant is being erected by the Pittsburgh-Des Moines Steel Co., who rendered valuable assistance to the owners in working out many of the details in the new features.

The Capital City Sand Co. has been in operation for the past eight or nine years and has established a most enviable reputation throughout the local territory for products of highest quality. They cover central Iowa in a sales way. The company has a capacity of 20 cars daily and has raw material enough to last for 20 years on the present site. They have the largest gravel storage space of any company in the state.

The Capital Sand Co. is incorporated and has the following officers: A. J. Harkins, president; Frank E. Ray, vice-president, and C. V. Ray, secretary-treasurer. Offices of the company are located at 308 Fifth street.

With the new plant ready for operation within a short time, a location that is second to none in this section of the state and the same general business policies in force in the future as in the past, the future success of the Capital City Sand Co. is assured. —*Guthrie Center (Iowa) Guthrian.*

Michigan Cement News

THE Newaygo Cement Co. plant has resumed operations and will start production, with a program that calls for about 750,000 bbl., or 3,000,000 sacks, for the season, a considerable increase over last year. The company closed last season with a reserve supply of about 100,000 bbl., and still has about 40,000 bbl. to start the spring work. The demand for cement promises to be very large this season, with much road work in prospect besides building.

The cement plant at Chelsea acquired by the state is turning out about 2000 bbl. of cement a day and will double this production by April 1. It was originally planned to have the capacity of the Chelsea plant 500,000 bbl. a year but it is believed that it will produce upward of 700,000 bbl. this year and, if funds can be obtained to increase the facilities, that upward of 1,000,000 bbl. can be turned out a year hence. Warden Harry L. Hulbert, in charge of all state prison industries, says: "We already have cut production costs 23 cents a barrel under former production figures for the same plant, are using seven less men, and expect to double our present capacity within 30 days." The same policy employed in working prisoners on the highways is being used in the Chelsea plant. The men are being paid $1.25 per day and a bonus for production. At the present time each prisoner at work in the plant is making about $1.40 a day.

Valuable Byproducts of California Gravel Plant

PLATINUM, the rarest and most valuable of minerals, has been discovered now in the washings from the gravel taken from the old Stanislaus river bed by the Atlas Rock Co., near Oakdale, Calif., according to a special dispatch to the Modesto *News*.

The company is now saving the larger part of the gold that is washed out of the rock and gravel which goes through the company's plant, and the gold more than pays the expense of the work required to save it. The last few days traces of platinum have also been found, in creasing the value of the product.

Additional riffles have been provided through the water and sand is run from the plant and once a week this pay sand is cleaned up. Company officials have been more than satisfied with the showing thus made.

The company is now shipping out about 17 cars of sand, gravel, and crushed rock a day and the production is slowly increased. The rock crusher, recently installed, is now working to perfection.

The above recalls the article in ROCK PRODUCTS, February 23, 1924, describing in detail how the Grant Rock and Gravel Co. of Fresno, Calif., recovers a considerable amount of gold from its operations.

News of All the Industry

Incorporations

Central Gravel Co., Alexandria, La., has been incorporated for $130,000.

Commercial Rock Crusher, Kansas City, Kans., has been incorporated for $20,000.

Concrete Pipe and Curb Co., New Orleans, La., has been incorporated for $30,000.

Arkansas Pipe and Supply Co., El Dorado, Ark., has been incorporated for $50,000.

Guaranteed Sand and Gravel Co., Emporia, Kans., has been incorporated for $30,000.

Logansport Stone and Lime Co., Huntington, Ind., has been incorporated for $50,000.

Stucco and Concrete Materials Co., Los Angeles, Calif., has been incorporated for $250,000.

Yakima Cement Products Co., Yakima, Wash., has increased its stock from $30,000 to $45,000.

Salado Gravel Co., San Antonio, Tex., has increased its capital stock from $12,000 to $30,000.

Englewood Stone Co., 25 East Palisade avenue, Englewood, N. J., has been incorporated for $125,000.

Rotan Cement Plaster Co., Rotan, Tex., has been incorporated for $100,000 by T. E. Lee and W. W. Barron.

Public Service Sand and Gravel Co., Los Angeles, Calif., has been incorporated for $50,000; shares, 500; subscribed, $300.

Cannady Mixed Concrete Co., Tulsa, Okla., has been incorporated for $10,000 by H. L. Cannady, L. S. McCaslin, and N. C. Orr.

Burton Concrete Products Corp., Fort Worth, Tex., has been incorporated for $70,000 by L. L. Burton, F. H. Scott, and J. W. Burton.

C. & P. Grey Granite Co., Llano, Tex., has been incorporated for $50,000 by E. M. Cassaday, W. D. Parkhill, and S. D. Young.

Union Hydraulic Plaster Co., Pittsburgh, Penn. Lime, plaster, etc.; $15,000. R. L. Taylor, Midway, Pa., is treasurer and representative.

San Juan Gravel Co., Friday Harbor, Wash., has been incorporated for $40,000 by L. G. Little, W. S. Sallee, and Mark Richardson.

Schile Sand and Excavating Co., Aberdeen, Tex., has been incorporated for $25,000 by George Schile, Mark Braniel, and W. D. Fenelon.

Poteau Brick Co., Poteau, Tex., has been incorporated for $45,000 by E. S. Hutton, J. W. Bates, of Muskogee, and J. W. Talton, Poteau.

Limestone Brick Corp., Hartford, Conn., has been incorporated for $250,000 to manufacture sand-lime brick, by Ralph M. Grant and others.

Lee & Van Orman Sand and Gravel Co., Yorktown, Tex., has been incorporated for $10,000 by W. E. Lee, C. E. Van Orman, and M. C. Driscoll.

Hallock Sand Co., Columbus, Ohio, has been incorporated for $100,000 by S. Neal Hallock, W. E. MacManiman, K. M. King, S. D. Hallock, and I. W. Hallock.

Century Hy-Pressure Concrete Co., of California, has been incorporated in Wilmington, Del., to manufacture concrete pipe, etc., with a capital of $100,000.

Waco Lime Products Co., Waco, Tex., has been incorporated for $600,00, and expects to have a daily output of 100 tons of lime and 40 tons of calcium arsenate.

Baragwanath Exploration Co., New York City, has been incorporated for $25,000 by J. A. Baragwanath, R. F. Goodwin, and I. C. Dempsey. (Attorney, J. F. Knorr, Albany, N. Y.)

A. H. Harvie Gravel Co., Cincinnati, Ohio, has been incorporated for $5000 by Arthur H. Harvie, Alfred R. Dorman, Ada Harvie, Carrie Dorman and Marguerite Finnegan.

Broom County Sand and Gravel Co., Binghamton, N. Y., has been incorporated for $25,000 by F. B. and G. D. Davis and J. J. Cox. Attorneys, Green, Blakeslee & Anderson, Binghamton.

Cast Stone Veneers, Inc., Boston, Mass., has been incorporated for $50,000 by Salvatore S. Zatolli, of Squantum, William B. Colleary, Cambridge, and Thomas E. Ryan, Roxbury. (Building Materials.)

Indiana Mineral Products Co., Wheatfield, Ind., paint pigments, paints and kindred products; $100,000. Incorporators: William O. Kruger, David A. Bennett and Ezra H. Stewart, all of Wheatfield.

United Rock Asphalt Co., Nashville, Tenn., has been incorporated for $200,000 by Benton McMillin, J. F. Ashley, Z. E. Robinson, W. R. Lasley, and A. H. Roberts. The property is located in Logan County, Ky.

Ione Quarries Co., San Francisco, Calif., has been incorporated for $200,000; shares 20,000; subscribers: Oscar Goodman, William Klein, Van R. H. Sternbergh, C. A. Bliss, and Fred Leve. Attorney, Fred Leve, Hobart Bldg.

Ozone Park Corp. (Cement Works) has been incorporated for $10,000. The directors are: Frank Canzano and Antoinette Canzano, 2337 Pacific street, Brooklyn, N. Y., and Ralph Cerulli, 4365 Jerome Ave., Ozone Park.

Colonial Cement Finishing Co., New York; cement finishes, colors, etc.; nominal capital $5000. Incorporators: R. Schonberg, F. Wald and R. B. Schiff. Representative: Shaine & Weinrib, 299 Broadway, New York.

Newberry Washed Sand and Gravel Co., Newberry, Ind., has been incorporated for $5000, to dig and sell gravel, rock, and other minerals. The officers are S. E. Moore, president, L. E. Stalcup, vice-president, and Alvin K. Keller, secretary-treasurer, all of Lyons, Ind.

American Portland Cement Co., Los Angeles, Calif., has been incorporated for $3,000,000; shares, 300,000; subscribed, $100. Directors: O. T. Deal, Davis Shepherd, C. E. Merrywether. Attorney, George F. Rankin, Pacific Finance Bldg.

Milan Gravel Corp., Milan, Ill., has been incorporated for $50,000 by Frank H. Warren, G. E. Peterson and E. M. Jenkinson. Correspondent: G. E. Peterson, assistant secretary, Rock Island Southern Ry. Co., 309 Lane Bldg., Davenport, Iowa.

New England Portland Cement and Lime Corporation, Rockland, Me., has been incorporated for $1,000,000. President, A. L. Miles, Rockland. S. T. Kimball, clerk and representative. Offices will be established in Boston, Mass., at 37 Milk street, after April 15.

Railroader's Lime Co., a South Dakota corporation capitalized at $250,000, has been authorized in Indiana as a foreign corporation, with a capitalization of $50,000 to quarry, crush, and market stone, and manufacture and market lime. The Indiana agent is G. B. Crowe, Corydon, Ind.

Phillips-Brooks Cement Products Co., Empire Bldg., Memphis, Tenn., has been incorporated for $10,000 by Mrs. S. H. Phillips, who has just formed this company to manufacture concrete products. President, Mrs. S. H. Phillips; manager, H. E. Brooks; and Dover Barrett, Joe Thompson, and Nate Sawrie as associates.

Berach Sand Co., Jackson, Ohio, has been incorporated for $100,000 to market sand and silica. This company has leased the Star Furnace farm and will, as soon as practicable, begin shipping the sand for molding purposes. The company has also leased the Hunter farm and has ordered machinery to crush the silica pebble which is found there. As soon as the machinery is installed they will be able to ship that product to the market. It is said that this is the finest deposit of material suitable for stucco work in Ohio. There is an immense ledge of the silica and it will furnish development for many years.

Sand and Gravel

Summit Sand and Gravel Co., Terre Haute, Ind., has changed its name to Terre Haute Gravel Co.

Granite Sand and Gravel Co. has opened offices at 32 Union Trust building, Indianapolis, Ind.

Industrial Sand and Gravel Co., Cuche, Okla., starts operation; 100 cars of gravel to be loaded daily.

Olean Sand and Gravel Co., Olean, N. Y., has taken over the plant and property of the Machias Sand and Gravel Co., which is bankrupt.

Indiana—Between 5,000,000 and 6,000,000 tons of gravel, the aggregate value of which was more than $3,000,000, were taken from Indiana pits last year.

Glenwood Gravel Co., Glenwood, Ark., is installing $5000 worth of modern machinery in its new plant, which is the second largest gravel plant to be located at Glenwood.

H. D. Conkey & Co., Mendota, Ill., announce that they are resuming operation of their plant with an increased capacity of from 60 to 70 carloads daily.

New York City had to go on a sand ration recently. Continuous high winds prevented the towing of barges to the city and stocks at dealers' yards were almost exhausted.

Three crushed rock producers, Jennings and Son, American Rock Crusher Co., and Robert M. Godfrey, T. M. Godfrey and S. R. Stimson are defendants in a suit in Kansas City, Kans., to restrain them from using such heavy charges in blasting.

Atlas Mixed Mortar Co., Burbank, Calif., operating a gravel pit in Stough Canyon, has opened offices at Burbank, and announces that enlargements of the facilities of the concern are contemplated.

Salem Sand and Gravel Co., Salem, Ore., has just purchased the plant of the West Side Gravel Co. of West Salem. The two companies are now owned by Charles K. Spaulding, Paul B. Wallace, and little Joseph Alberts.

William De Lhorbe, Oregon, Ill., has bought the Harry Boyden gravel pit on the east side of the river, and is building a plant for washing and screening the gravel, and storing it in bunkers from which it can be loaded without shoveling.

Dill & Worland Gravel Co., Shelbyville, Ind., has sold out to Morrow & Cross of Rushville, while operating the pit the past few years. The new proprietors of the pit will make some added improvements and expect to be ready for business by April 15.

Missouri River Sand and Gravel Co., Boonville, Mo., has pumped 50,000 tons of Missouri river sand and gravel annually from the bed of the stream. The company was established over 30 years ago, and the Big Muddy has always been equal to the demand made upon it at this point.

Cherokee, Iowa—The Illinois Central is assembling cars, preparatory to the operation of the gravel pit. As it is not known that any work in the immediate vicinity of Cherokee is planned, it is surmised that the material to be taken out will be utilized for the improvement of new roundhouse and mechanical coaling station sites at Sioux City.

Urbana-Greenville Gravel Co., Urbana, Mo., has recently resumed operation of its plant. For the past several months the company has been doing repair work only. However, the company reports that it was hard pressed by the railroads for gravel, which necessitated starting the work. The pit located at Mechanicsburg was put under way about the same time. Only day shifts will be kept working for the present, however.

Mena, Ark.—After spending many thousands of dollars in having gravel shipped from Sevier county to be used in surfacing Polk county highways, deposits have been found here that will serve just as well as the imported product. Federal highway engineers have given approval to the use of the local gravel, and work of putting it on federal aid projects will be started at once. Pits will be opened near Potter.

Syracuse Sand and Gravel Co., Inc., Syracuse, N. Y., has been recommended for dissolution by Edmund H. Lewis, appointed as referee by Justice Ernest I. Edgcomb, on application of a majority of the stockholders seeking to wind up the affairs of the company. The company has been in financial distress for the last two years, meeting with several reverses, including the loss of two barges and a tug in the explosion on Oneida lake in 1921, according to reports.

La Grange, Mo.—Great gravel beds were discovered in Lewis county when a sawdust pit was dug in a small patch of timber in the lowlands, about two miles from the Mississippi river. The middle of the deposit is overlaid by a 4-in. stratum of limestone, according to tests made by the highway department, who figures that this gravel costs about one-half the amount crushed rock would cost. When taken from the bed, it is ready for use without mixing with any other material.

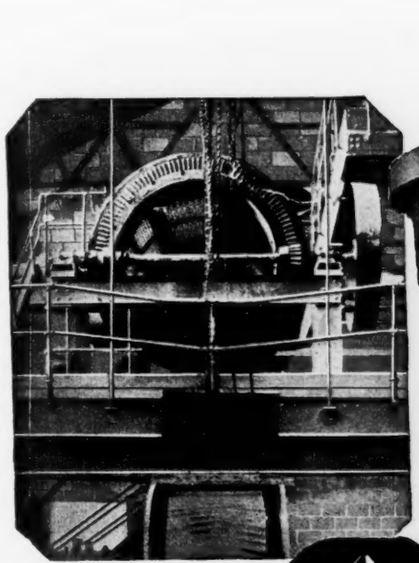
Elmer Boyle, 603 Schweiter Bldg., Wichita, Kans., has obtained a lifetime lease on the gravel beds, five miles south of Wichita on Seneca street, located on the Bone farm. The gravel, said to be the best in the county for road building purposes, will be sold on a royalty basis, and in addition to handling it to patrons by the wagon load enough will be sold to ballast the Rock Island railroad for many miles each way from Wichita, it is stated.

Lafayette, Ind.—Preliminary hearing of the peti-

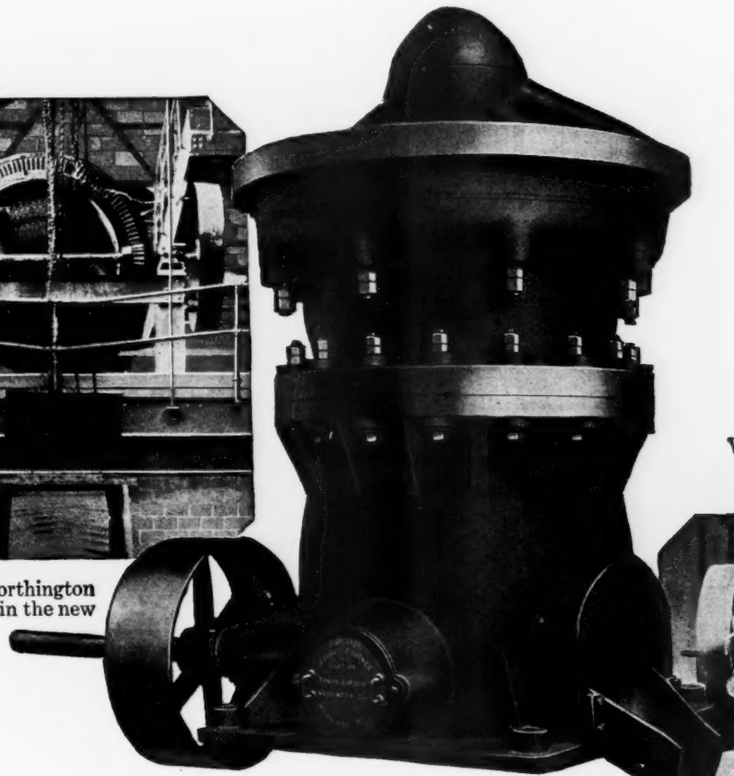
Worthington Crushers in the New Dixie Portland Cement Mill

The new mill of the Dixie Portland Cement Company, at Richard City, Tenn., has Worthington Superior McCully Gyratory Crushers.

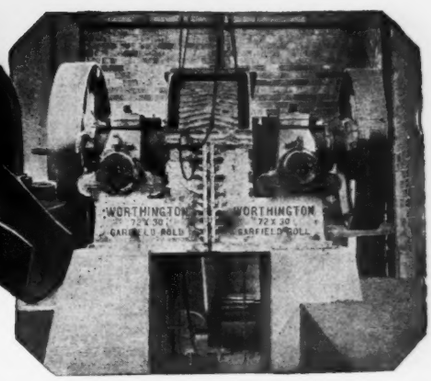
This plant is also equipped with screens and rolls made at the Worthington Power and Mining Works.



72" x 12' Worthington Rotary Screen in the new Dixie plant.



Superior McCully Gyratory Crusher.



Worthington-Garfield Roll installed in the new Dixie plant.

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Snow-Holly Works *Buffalo, N. Y.*
Epping-Carpenter, *Pittsburgh, Pa.*

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tion of the Western Indiana Gravel Co. against the New York, Chicago & St. Louis Railroad Co. before W. M. Cheseldine of Washington, examiner for the Interstate Commerce Commission, asking a rate adjustment, was held recently in Indianapolis. The petitioner alleged that the rates on sand and gravel in carload lots from Lafayette to points on the railroad's line should be revised to permit it to compete with other sand and gravel concerns.

Adair County, Missouri—Since the announcement of the finding of a large bed of gravel near LaGrange, Mo., several persons have suggested that there might be such a bed in Adair county, and if anyone knows of the existence of gravel in any quantity he is asked to inform the county highway engineer. The finding of the gravel bed near LaGrange will be a big help to the road building program of Missouri, as it will afford cheap gravel; and if such a bed could be located in this county it would probably provide for excellent roads at a small cost, according to some of the good roads boosters. It is reported that the farmers in the vicinity of the large gravel bed in Lewis county have made 30 miles of excellent road by using the gravel.

Carrollton, Mo.—E. C. Johnson, road contractor and engineer, has recently taken up options on a 2,000,000-ton gravel pit just across the north boundary line of Carroll county, in Livingston county. Samples of this gravel have been sent to the state highway authorities at Jefferson City for a rating as to its quality for road work. The pit is large and contains about 2,000,000 tons of good quality rock. It is within a short distance of the Wabash railroad and would be very easy to get to market. It is estimated that there is enough gravel in the pit to hard-surface the road from Carrollton, south to Waverly bridge, and east to the Cabbell farm, seven miles away.

Fewell-Webb Sand and Gravel Co., Culver City, Calif., is said to be one of the largest organizations of the kind in Southern California. It was organized in Culver City two years ago and since then, branches in Hermosa and San Pedro have been organized. The Fewell-Webb Co. is a $50,000 concern. It is reported that Manager Webb is of the opinion that the future of Culver City as an industrial center is assured. Many large companies, with the co-operation of the local civic organizations are slated to locate in the Hub District to make it a huge industrial center, just as it has become a studio center and an amusement district.

Lime

Port Byron Lime Association, Port Byron, Ill., has resumed operation of its plant which has been closed since Christmas. G. E. Sudlow, manager, announced that there are sufficient orders booked to keep the plant working to capacity until next Christmas.

Hellams-Tummel Lime Co., 628 Elgin avenue, Muskogee, Okla., has commenced the construction of the first unit of a new plant for the production of calcium lime for chemical service, estimated to cost close to $65,000. Other units will be built at a later date as they are needed.

Missome Lime Plant, Auxvasse, Mo., recently taken over by the Roadway Material Supply Co. of St. Louis, is to be enlarged, and the capacity will be 1000 tons of crushed limestone a day, it is reported. Harold E. Pierce is sales manager. The plant will be under the management of Lester Bailey of Cape Girardeau, who is also superintendent of the Cape Girardeau Sand and Gravel works.

Gypsum

United States Gypsum Co.'s plant at Oakfield, N. Y., was recently wrecked and a number of employes were injured slightly when a flywheel broke loose and hurled itself through the walls of the building.

Merritt, Wash.—Mr. G. W. Hunt of Vancouver is here in connection with the development of the gypsum deposits on the hillside immediately north of the city. It is stated that a force of men will be employed sufficient for a minimum output of 1000 tons during 1924.

Sand-Lime Brick

Clayton Brick and Tile Co. has moved its plant from Clayton to Dubuque, Iowa. If the company executes a permanent lease, it is reported that it will erect a one-story plant, 60x100 ft., and will employ about eight men.

Phosphate Rock

Farmers' Ground Rock Phosphate Co., Mt. Pleasant, Tenn., has surrendered its charter.

Official figures for the 1923 fertilizer tonnage have been received by the American Fertilizer from 19 states. Compared with the previous year's sales, these figures show a gain of 16.2%. If this proportional gain is maintained in the states not yet heard from the total sales for 1923 will amount to 6,897,445 tons. This is almost exactly the quantity sold in 1919, and has been exceeded only in the record year of 1920, when sales reached 7,639,239 tons.

Slate

Bluemont Stone Co., Conowingo, Pa., has acquired property near Cardiff, Pa., and is said to be planning the installation of electric power and other equipment for slate production.

Silica Sand

Hazel-Atlas Glass Co., Blackwell, Okla., has begun operation after a shut down of several weeks for repairing and enlarging the plant. About 125 additional men will be employed.

Agstone

Lebanon Calcium Carbonate Co., of Lebanon, Tenn., has been formed by Rev. W. J. Watson, J. F. Ramsey and W. L. Baird. It will crush a high-calcium limestone for the local agstone market.

Manufacturers

Ruston & Hornsby, Ltd., has changed its London address to Imperial House, 15-17-19 Kingsway, London, W. C. 2, England.

Collin-Kay Machinery Co. has been formed to handle industrial, mining, railroad and rock products machinery in southern California. The firm is a direct representative of the Fate-Root-Heath Co., the Morgan Engineering Works, Vulcan Iron Works and Northern Engineering Works. Headquarters will be in Los Angeles.

Raymond Brothers Engineering Co., Chicago, designers of "Rayco" Pulverized Fuel Systems and manufacturers of machinery and equipment for preparation and utilization of pulverized coal, announce the removal of their general sales office to the Combustion Engineering Corporation building, 43 Broad street, New York City. H. D. Savage, vice-president and general manager, Combustion Engineering Corporation, will be in charge of sales.

Personals

William H. Hoagland, president of the Marble Cliff Quarries Co., Columbus, Ohio, is one of the new vice-presidents of the Athletic Club of Columbus.

W. H. Green, who left the United States in 1921 to erect and operate a cement mill in India, is returning to this country for a six months' holiday.

John J. Moore, long connected with the Thomas Elevator Co., Chicago, has resigned his position to go with Day & Maddock Co., who are Thomas Elevator Co. agents in Cleveland, Ohio.

Yates F. Hamm, district sales manager for the Monolith Portland Cement Co., has just undergone an operation on his foot in Seattle, Wash., as the result of an accident.

W. S. Keith, Lowman Bldg., Seattle, Wash., has been appointed representative of the Standard Gypsum Co. for Washington. The company manufactures standard hardwall plaster at Ludwig, Nev.

John G. Twyford has returned to San Francisco from a three weeks' visit of the Pacific Northwest where he closed transactions for the development of business in that section for the Standard Gypsum Co.

H. G. Thompson has gone to Memphis, Tenn., where he will be employed at a gravel plant owned by the Greenville Stone and Gravel Co. His place as manager of the crushing plant at Hardy, Ark., has been taken by H. C. Martin.

Tom H. Ewing, formerly of Minneapolis, Minn., where he represented the Plymouth Clay Products Co., is now part owner and sales manager for McCracken Concrete Pipe Co., which has established plants in Sandford and Tampa, Fla.

P. F. Theobald, who has been works manager at the Fort Dodge, Iowa, plant of the United States Gypsum Co., has been transferred to the Oakfield, N. Y., plant. He succeeds H. V. Croswell, who has been made mine superintendent for the Eastern division.

Roy G. Owens is now handling the Chicago territory of the Northwest Engineering Co., 28 East Jackson blvd., as Chicago agent, with offices at 811 Steger bldg., Chicago. Mr. Owens has had broad experience in the contracting field, which will enable him to give valuable advice on crane and shovel problems.

J. J. Ball of Little Rock, for several years a vice-president of the Good Road Gravel and Sand Co., disposed of his holdings to local business men, and will no longer be associated with the local organization. This company has done an extensive business in this section, furnishing material for much road building, street paving and other building.

Gabriel S. Brown, president of the Alpha Portland Cement Co., recently started on a three months' trip to the Philippines, China and Japan. It is stated that the trip was being taken in the interest of business, although the main offices of the company refused to make any statement of the object that is taking Mr. Brown to the Orient.

Oscar W. Johnson has returned from New York, where he was sent to make preliminary plans for the opening of offices for the company that operates the Utica Silica Works, of which Mr. Johnson has been general manager for several years. The company is planning the erection of a new plant in the East and has appointed Mr. Johnson to supervise its construction.

Obituaries

T. J. Fleming, secretary and general manager of the California Portland Cement Co., died at his summer home in the San Jacinto mountains near Lake Hemet, called Keene Camp.

Charles F. Phillips, president of the Union Limestone Co., general manager and a director of the Stewart Furnace Co., Sharon, Pa., died at Atlantic City, March 22, aged 60 years. He played a prominent part in the development and success of the Stewart company, with which he had been identified 40 years. He was a son of the late John Phillips, a pioneer resident of Sharon, where he had lived all his life.

Trade Literature

English Bros. Machinery Co., Kansas City, Mo. Bulletin No. 80 illustrating and describing "Samson" hoists for electric or gasoline engine power. A number of styles are shown, and specifications and tables of sizes are included.

Hercules Powder Co., Wilmington, Del., has issued a handsome booklet entitled, "Conquering the Earth," which is a splendid example of art in printing. The booklet elaborates on a number of events through the ages from stone hatchets to dynamite, upon which a series of historical advertisements of this company was based.

Star Brick Corp., 17 East 42nd street, New York City. Folder setting forth the story of sand-lime brick and its increasing use as a basic structural material. The first page of the booklet tells who's who in the company, and there is also a short account of the business, the plant, the management, etc., of the Star Brick Corp.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., has recently issued circular, No. 1670, entitled "Static Condensers for Power Factor Correction," discussing the need for power factor correction and the methods of obtaining high power factor. The method of selecting the proper corrective device for power factor is carefully analyzed, and the fields of application of synchronous and static condensers set forth in diagrammatic form. An illustrated description of Westinghouse Type LD static condensers with wiring diagrams for two and three phase equipment is included, and also tables of weights, dimensions and losses of static condensers and weights and dimensions of transformers.